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TRIAL.

BOSTON GAS LIGHT COMPANY

VERSUS

WILLIAM GAULT,

CONTAINING THE

ARGUMENTS OF COUNSEL,

AND THE

CHARGE OF THE JUDGE.

WILLIAM WHITING,
GEORGE M. ROBINSON, } *Counsel for the Corporation.*
MARSHALL S. CHASE, *Counsel for the Defendant.*

J. H. BUCKINGHAM AND THOMAS TILESTON, JR., *Reporters*

BOSTON:
1848.
EASTBURN'S PRESS.

Rec. June 20, 1904

TRIAL.

COMMONWEALTH OF MASSACHUSETTS.

Court of Common Pleas.

Suffolk, ss. }
July Term, 1848. }

PRESENT,

Hon. HORATIO BYINGTON, Associate Justice.

Boston Gas Light Company vs. *William Gault.*

William Whiting, }
George M. Robinson, } *for Plaintiffs.*

Marshall S. Chase, *for Defendant.*

On Friday, July 27th, this case, having been postponed from time to time at the request of the defendant, came on for trial.

Jury Empannelled.

Henry D. Wakefeild, apothecary, 733 Washington street.
Avery Plumer, Jr., flour dealer, 5 City wharf.
Joseph West, hard ware dealer, 5 Dock square.
John Shaw, silversmith, 85 Charter street.
Dana Parks, teacher of dancing, 20 Harvard street.
Jotham Salisbury, boot and shoe dealer, 90 Commercial st.
Timothy B. Wood, coal and wood dealer, 30 Charles street.
William Lawrence, grocer, 14 Batterymarch street.
Davis Litchfield, ship builder, East Boston.
Jonathan Livermore, painter, 3 Grove place.
Israel Prescott, carpenter, East Boston.
Henry C. Brooks, West India goods dealer, 38 Commercial wharf.

Mr. Robinson opened the case for the Plaintiffs, and read the writ, which was as follows; —

Commonwealth of Massachusetts.

{L. S.} Suffolk, ss. *To the Sheriff of our County of Suffolk, or his Deputy, or any Constable of the City of Boston,* Greeting:

We command you to attach the goods or estate of William Gault of Boston, in said County and Commonwealth, merchant tailor, to the value of sixty dollars, and summon said Gault, (if he may be found in your Precinct) to appear before our Justices of our Court of Common Pleas, next to be holden at Boston, within and for our said County of Suffolk, on the first Tuesday of April next; then and there in our said Court to answer unto The Boston Gas Light Company, a Corporation duly established by law, in a plea of the case, for that the said defendant, on the day of the purchase of this writ, being indebted to the plaintiffs in sixty dollars for goods sold and delivered by the plaintiffs to the defendant; and in the same amount for work done, and materials for the same provided, by the plaintiffs for the defendant, at his request; and in the same amount for money lent by the plaintiffs to the defendant; and in the same amount for money received by the defendant to the use of the plaintiffs; and in the same amount for money paid by the plaintiffs for the use of the defendant, at his request; and in the same amount for money due from the defendant to the plaintiffs for interest of money before then due and owing from the defendant to the plaintiffs and by the plaintiffs foreborne to the defendant, at the defendant's request, for a long time before then elapsed; and in the further sum of twenty-five dollars, and fifty-five cents, according to the account annexed; — in consideration thereof promised to pay the same to the plaintiffs on demand; yet he has not paid the same.

The plaintiff for specification of claim will rely upon the following bill: —

Wm. Gault,

To the BOSTON GAS LIGHT COMPANY, Dr.
OFFICE 102 WASHINGTON STREET.

From Oct. 1, 1847 *To January* 1, 1848,	*To* 7300 *cubic feet of Gas, at three and one half mills per foot,*	$25.55

To the damage of the said Boston Gas Light Company (as *they say*) the sum of sixty dollars, which shall then and there be made to appear, with other due damages. And have you

there this writ, with your doings therein. Witness DANIEL WELLS, Esquire, at Boston, the nineteenth day of February, in the year of our Lord one thousand eight hundred and forty-eight.

(Signed) GEO. C. WILDE, *Clerk.*"

MR. ROBINSON then spoke as follows: —

MAY IT PLEASE THE COURT:

Gentlemen of the Jury, — This case, which we are about to submit to you, is, as you have just heard in the writ, an action brought by the Boston Gas Light Company, a corporation well known to you all, against William Gault, for gas burned or consumed by him, as is alleged, and for which he refuses to pay.

This is one of the description of cases not uncommon, which, although not of any very great amount in themselves, are of great importance in their ultimate results. The result here depends upon your decision, and to you, gentlemen, as twelve intellectual and unprejudiced men, we cheerfully trust what we may have of proof to offer.

It has been somewhat the habit of a few, and I am glad to say, but a few of the customers of this company, to make and circulate unfounded charges against them, denying the fairness and accuracy of their method of measuring gas, and imputing to them dishonesty and low cheating, in sending bills for gas which they know has not been had. We shall endeavor, gentlemen, in the course of this trial, to demonstrate the perfection to which the meter, this beautiful piece of machinery, has been brought; to show to you the really surprising accuracy with which it works, and to prove that should it sometimes get out of order, as all machines made by human hands will and sometimes must, it cannot but result that the consumer of the gas is always benefited by its inaccuracy, — that all errors of measurement, if any are made, must, from the very nature of the instrument, be against the interests of the company.

We might, perhaps, argue that the defendant has impliedly contracted with this company to pay for gas as measured by the meter, and therefore is liable, without putting us to the trouble to prove its accuracy, on the ground of his having paid former bills without objection — bills made out in the same manner as this, and from measurement indicated by the same meter, — thus inducing the company to continue to supply him and to supply him in the same manner. But this argument we shall not press, as our object is not so much to recover the paltry demand in question, which, if recovered, will

go but a very little way towards paying the expenses of this trial, as to invite your attentive examination, fairly, candidly, and in good faith, of all the dealings and modes of doing business of this company; in order to refute assertions which have been made, which are as unfounded as they are unjust.

The bill, gentlemen, is for gas furnished from October 1, 1847 to January 1, 1848, 7300 feet at 3½ mills per foot, $25.55. We shall now proceed to trial, and in so doing we expect to prove —

1st. That the defendant has actually used the amount of gas charged to him.

2d. That the amount charged is such and so much as was indicated by the meter.

3d. That the meter is a true and correct measurer of gas.

4th. The value of the gas.

Chase for the defendant asked that the jury be polled to see if any one of them is a member of the corporation, or whether, since the commencement of this suit, they had any of them examined any meters.

This was satisfactorily settled, and the legal existence and incorporation of the company was admitted by the defendant.

EVIDENCE FOR THE PLAINTIFFS.

Mr. Robinson then called,

George Slater, and asked if he was employed by the Gas Company —

Mr. Chase objected to the question as irrelevant.

The Court did not see how, and allowed the examination to proceed.

Witness was employed by the Gas Company to take the state of the meters, and did take down the state of this meter. I mean, take account of the figures on the index, showing how much gas is measured. From October 1, 1847, to January 1, 1848, there was a meter in the shop of the defendant; it was in the cellar directly under his store; it was one of the Gas Company's meters, the same one now in the entry of the court, the smallest of the two. I took notice of the figures and put them down in a book which I kept for that purpose. It was my duty to take the account of the meters once in three months. The book shown to witness is the one he used, and contains the entry of Mr. Gault's account at the time in question.

[Witness was proceeding to read the account, when Mr.

CHASE objected to it as not the original entry, but the objection was overruled, and he read, showing the following as the account kept:—]

WASHINGTON STREET.

			1847. Sept 27.	1848. Jan. 5.	April 1.	June 26.	
34	J. Campbell.		837.	612.	201.	460.	
35							
36							
36	Asa White.		742.	764.	771.	771.	not used.
36							
36							
37	N. K. Skinner.		591.	890.	037.	106.	
38	J. H. Wright & Co.	1323	199.	920.	015.	328.	
39	Prentiss Whitney.	5 Lt.	372.	520.	628.	700.	
40	J. Ross & Brother.	1304	920.	615.	015.	429.	
41							
42	J. Ross & Brother.		802.	668.			
43							
44	James Eaton.	1387	377.	045.	shut.		

Note. The dates at the top of the third, fourth, fifth and sixth columns after the names are the dates when the men went round to take account from the meters. The figures in the columns preceding the names are the numbers of the street. The names and all the other figures, except the numbers of the street, are in pencil. The dots after the figures indicate that the account has been posted to the leger. The figures 1323, 1304, and 1387, next after the names of Wright & Co., Ross & Brother, and Eaton, are the designating numbers of the meters used by them. Gault kept at No. 38, and the figures under Sept. 1847, and Jan. 1848, are the charges against him, the latter being the bill in suit.*

The name of J. H. Wright & Co. with the marks under it, indicate that there has been a change in the occupants of the store; the name written there was originally William Gault. It is my business to change the names as written in pencil, erasing the former and inserting that of the present tenant. J. H. Wright & Co. occupied the shop after Gault. The No. 1323 on the account, is the number on the meter now in the entry; it was also used by Wright & Co. Has been my business to take account of the state of meters for ten years, and I have had no other business during that time. After I have taken notes of the meters and entered them in this book I return it to the clerk of the Company, Mr. Stearns, and then my duty ends for the time. Have no acquaintance with Mr. Gault and cannot swear that he ever took gas; all I know is the state of the meter, and the name of the occupant of the premises.

*The number of meter is set in the meter book when more than one in store.

Cross Examined. Am employed on a salary of twelve dollars a week, and have no commissions and no other interest in the Company and own no stock. Sometimes I collect bills. Only have this book in my possession while I am going round once in three months; in the mean time it is out of my possession. A man by the name of Merrill took the shop immediately after Gault and applied for and used gas; his name was on the book, but was erased, when Wright's was put down; don't know how long he was there.

Joseph G. Stearns. Am clerk to the Boston Gas Light Company. Have been so six years the 16th of last December. When I entered upon the office I was sworn to the faithful performance of the duties of it. My duty in regard to all consumers of gas, is to take the book from the man who takes the account of meters, and enter the figures on the leger from that.

I find in the leger a transcript from the registry book with regard to Gault. Generally enter the register once in three months, but sometimes once a month, sometimes once a week, and as occupants leave or come into a store. When the entries are made I lay the register book away in the safe. When a person gives notice of leaving premises where he has taken gas, the state of his meter is taken and entered on the leger; generally it is taken on the register book, but sometimes on a mere memorandum, and transferred to the leger.

[Mr. Chase here objected to the leger as it appears that it is not a book of original entry, but only a transfer.

Mr. Whiting replied and cited the case where original memoranda were made in chalk on a butcher's cart, which could not be brought into court, and the transfer from it was allowed as an original entry. All we attempt to show is that the witness, having no interest and not being a party to this suit, made this entry in the ordinary course of business, as it was his duty to do. We offer this book as the book of original entry of the corporation, not as a copy. The memorandum book does not contain a charge against customers; it is only a memorandum.]

At 4 o'clock, P. M., adjourned to the next morning.

Saturday, July 29, 9 A. M.

The Court ruled that Mr. Stearns's testimony as to this being a charge as to the account of the defendant, may go in, and that the leger may go to the jury as the book of original entry.

Mr. Stearns in continuation—

The charge is $25.55, and is headed William Gault; it it is for 7300 feet of gas. This is my original entry of the charge, it is in the book of original entries, all of which are made in the ordinary course of business from time to time; they are all truly made at the times they bear date, or within a day or two; perhaps on the same day. Gault has paid former bills for gas; four quarters in full and part of a quarter, being from Sept. 14th, 1846 to Oct. 1, 1847; from Sept. 1846 to April 1st, 1847, at the rate of 4 mills per foot; since that time at the rate of 3½ mills per foot; the present bill is made out at the lowest rate. Bills are made out by me, and when paid to the collector he pays the money over to me. I know that Gault burnt gas in his store during the time specified in the bill. Am not certain whether Gault ever paid me at the office any one bill. All his bills are paid except the last. We have also a cash book, in which we enter the receipts of cash from customers.

Cross Examined. Am clerk and keep the books. Do not collect bills nor receive any commissions, nor do any other business. Am paid a salary. All bills are made up to the 1st of January, April, &c., as the case may be. It is impossible to take the accounts of all the meters on the first day of the month, and therefore the man is sent round some days before; the account is taken on the day the taker calls on the customer, and what he uses after that time goes on to his bill for the next quarter; it makes no difference to the customer if he continues to take gas, but if he discontinues at the time his bill is presented, the Company lose the intermediate supply. This charge was made by me as on first of January, but I can't swear as to the exact day. I should not have made it unless it had been on the register book previous to the 5th of January. Sometimes meters are taken three or four days before, and sometimes three or four days after the quarter day. Don't know that Gault burnt gas except from his paying his bills. Was never in his store.

To Mr. Whiting. Have seen Gault in the counting room of the Gas Company. He came on some business relating to gas.

Cross Examination. My impression is that he came to pay me one bill. I cannot tell whether he came in relation to purchasing coke; he either called about having his gas fixed or to pay his bill. Think he did not call about coke, but cannot swear positively.

Henry Davis. I live in Boston, and am collector for the Boston Gas Company. Have been in their employ for the last seven years up to last April. I know Gault and have had bills against him for gas. I do not receive commissions,

but am paid a salary. Have delivered one bill, for twenty-five dollars and some cents, which is not paid.

To a Juror. Am not otherwise connected with the Company than to get my daily living.

Direct Examination. Gault while in Washington street paid me no bill; he did, when he kept in School street; have presented bills to him in Washington street. Gault has not paid any thing to me since he has been in Washington street; he thought me rather a hard dunner and would not pay me, but preferred paying at the office. Since he went into Washington street I have merely left the bills and passed out; if they were not paid by the first of the next month I dunned again. Never had any particular conversation; I presented it at his place of business, and called once or twice afterwards. I reported that this bill could not be collected, probably, in order that Mr. Darracott should write Gault a letter, according to custom with delinquents. Gault never told me he did not have the gas.

It is part of my duty to carry letters to delinquent customers from Mr. Darracott, the agent of the Company, — customers whose bills lie over a month. It is my habit to make a cross against the names of persons whom I have notified, in my book, and on referring to it I find a cross against Gault's name.

Cross Examined. Have no recollection of any conversation with Gault as to this bill. Have no distinct recollection of leaving a letter for him. I think he once disputed a small bill of five or six dollars, on the ground that he had paid it, and thought he had lost the receipt.

To Whiting. He had not paid that bill to me, and if he had paid it at the office, it would have been crossed off the book before I took it from the office the next morning.

Cross Examination resumed. I am the only collector, except occasionally, when I am on a quarterly route and weekly bills come due, or sometimes when gas is shut off, when the bills are given to the gas man.

Charles Brintnall, Jr. I live in Boston, and am clerk to the Boston Gas Company. I receive money and enter it on the cash book. I find in my hand-writing, under date of Jan. 30, 1847, an entry — William Gault, paid $26.80. Cannot tell from whom I received it. The bill was brought into the office by somebody, and I received the money and credited it. I have no particular recollection on the subject; the entry was made in the ordinary course of my duty; it is a true entry. An entry May 1, 1847, of $10.85, is not in my hand-writing, and the entries of July 3, 1847, and Oct. 28, 1847, are not in my hand-writing.

Cross Examined. Do not recollect any objection to this bill at the time it was paid.

Mr. Chase exhibited to witness three bills, and asked if they were receipted by him. Witness answered yes. They were as follows: from Jan. 1846 to April 1846; from Oct., 1845 to Jan., 1846; from Oct. 1846 to Jan., 1847, $26.80; they were all signed Charles Brintnall, Jr.

Four others were exhibited which witness did not sign; they were as follows: from April, 1845 to July, 1845, signed H. Davis; from July, 1847 to Oct., 1847, signed, Samuel Hallett; from April, 1846, to July, 1846, signed Samuel Hallett; from Jan., 1847 to April, 1847. The signatures were all admitted by plaintiffs to be genuine.*

Nathaniel W. Turner. I reside in Chelsea, and am in the employ of the Boston Gas Company, as a gas fitter. Have been in Gault's store but did not put up the fixtures there; I went to see about the gas as it did not work well; went in the day time to fix them; went one evening and found one burner did not burn well — next day I fixed it and in the evening went in and asked Gault if it worked well, and he replied, "Yes, there is no trouble to-night, it all works well."

Cross Examined. This was in December last. Saw Mr. Gault then; it was in the evening, not far from seven o'clock; he was standing against the cutting board.

By Mr. Whiting. Can you tell how the company from Oct., 1846 to Jan., 1846 measured their gas? Objected to by defendant's counsel, but allowed by the Court. Answer. When we go round we take the statements of the meters; Mr. Slater goes round for this purpose; we measure gas by what are called meters; I am not acquainted with the process. All gas delivered by this company is measured by meters. I think it is a true measure. I know the fact that the meter is a true measure.

Cross Examination resumed. I know that a meter is correct, because we have a proof meter and a gasometer by which all other meters that are sent out are proved before they are sent to be put up. I have never tested it myself but have seen it in operation, and seen at least fifty others proved by it. Have seen it in operation half a dozen times.

Richard Hodson. I am a meter maker. Have no interest

*The money is frequently received and bill receipted by one clerk and handed over to the other, who enters it in the cash book. Gault's bills were often paid to Hallett, who went to shut off the gas for non-payment.

in the company, and am paid by a salary. I do the tin work and the putting together; the brass part of them is not in my line. My business is to try all meters after they are put together. I have done nothing else but this for twelve years. We have patterns and frames, which enable us to make one just like another. When one is done it is always proved to see if it is correct. It is proved by the gasometer, which is a gas measure, like a wine gallon measure, or any other. If at all out of the way we regulate the meter by the height of the water line; when the water is too high or too low it can be altered by raising or lowering the screw; the height at which the screw hole is placed regulates the height of the water in the meter. When a meter is done and tried, and it measures two per cent. too little we lower the hole. When it overruns much we should raise it; but if only two per cent. we do not always alter it. But we always calculate to have it correct and exact.

I understand the machinery of the gasometer and how meters work. I made this meter. Don't know that it was in Gault's store. Have proved this meter, but have not seen it since; it appears to be in the same state as when it left me; the screw-hole appears to have leaked, and there is some solder on it. If the screw-hole should leak and let the water down, the consequence would be that it would stop the gas, but if it did not go down far enough to stop the gas, more gas would be used than would be marked on the register. I see no signs of any alteration in this meter. I should know if it had been taken to pieces and put together again.

The gasometer is made of a given size, and the number of feet it holds is marked on the brass scale which slides down into it. I have proved this meter by the gasometer which stands in the entry. Mr. Slater proved this when it came back to the office, in my presence; it was correct then; in my opinion it could not have been out of order in the mean time, — that is, while it was away.

Mr. Slater recalled. I brought this meter from the entry. It is the same that was in Gault's shop.

Cross Examined. It was taken from No. 38 Washington street, from the cellar in front, under the store formerly occupied by Gault. I removed it about two weeks ago and have seen it every day since, in the work shop.

Mr. Hodson recalled. I should have stated that I could not say from my own knowledge, that this meter had not been incorrect during the time it was away, but my opinion is that it must have been in perfect order all the time, or

otherwise it would not have worked correctly when it came back.

William Lawler. I have been in employ of the Boston Gas Company, twenty years last May. During that time was foreman of the fitting department, until eighteen months ago. Believe I proved the first meter ever made in Boston. I now superintend the manufacture of gas at the Company's works. Never knew the Company to send out a meter without it was first proved and proved thoroughly. Persons who prove them have no interest in the Company, that I know of, and ought not to be interested. When meters come out of the maker's hands, and before they are painted, they are carried up to the proving room and placed on a bench which is made perfectly level, as perfect as it can be by a spirit level; a small gasometer is placed at the end of this bench, on which is a scale, which tells the number of cubic feet and inches of gas it holds; a proof meter is attached to this, and a given quantity of gas is delivered into it from the gasometer, thence into the first meter of the row, thence into the second, and so on through the whole line. We tell the measure by the index of each meter, all being uncovered, and the registers of all being set at zero or 0. If, after the gas has been passed through all the meters and all are found to conform, they are set down as correct. If any do not conform to the proof meter, they are taken out and set on one side. The index indicates the number of revolution of the cylinder wheel which is inside of the meter. If the index is made correct it tells the truth. In proving meters some measure too much or too little, and these are sent down to the work shop to be corrected. The measure depends entirely on the water line, which is raised or lowered by altering the screw-hole. After they are corrected they are tested again, and some, even, are altered and proved two or three times. None are ever sent out that are not proved to be correct. And they are never painted until they are proved to be correct, because it would be difficult or impossible to repair them without scraping off the paint — solder would not stick to the paint. Do not recollect that we ever sent out a meter before it was painted. Have compared our meters with those imported from other countries, and with those from other parts of the United States; ours always conformed to those as near as I could see. Our proof meter came from Scotland. We have what are called dry meters in the office; cannot tell what difficulty there is in measuring by dry meters; have examined them, and understand, I think, the principle on which they act; should say they are not so durable as the water meters.

Have always been in the habit of comparing foreign meters, and we have had a number of them in use in this city. There is no difficulty at all in measuring a cubic foot of gas.

[Here the witness went into an explanation of the operation of a meter, and explained it by taking the model to pieces, and showing the jury all its parts.]

If in the course of time a hole should rust in the tin wheel, so as to allow gas to escape, that gas would not be registered, and the consumer would use it for nothing. So, also, if by too great friction or any other cause the wheel should turn irregularly, gas would escape without being registered; and if the water line should get too low, the consumer would in each case use more gas than he would have to pay for. If the valve closes the gas stops flowing, and the register never works unless the gas flows; if the water is too high it shuts off the light. The extreme variation in favor of the company can never, in my opinion be more than one per cent., and it may be two per cent. in favor of the consumer. If the line is too high the variation is in favor of the Company, but if it is too low it is against the Company, sometimes as much as from six to ten per cent. There is always an evaporation of the water going on; the gas takes up the hydrogen of the water in the meters, by which there is a loss to the Company, as this lowers the water-line; and this would be the case whether the meter were placed on a level or not. To remedy this, meters are refilled as often as once in two months, and where much gas is used weekly. The Company always require that the meters should be put up on a level, and every fitter is furnished with a spirit level to put them up by.

The quantity of gas made by the Company is always measured and known by them; so, also, is all that is delivered and all that is sold. All the gas made is passed through a large stationary meter, and measured by me, and an account of it is taken by me, and no one else. We are very well satisfied if we do not lose five per cent., of all that is made. The meters always show that less of gas has been delivered than has been made, and this loss is independent of what is supposed to be lost by imperfections in the Company's pipes, such as leakages, breakages, &c., all which incidental losses are first allowed for.

When the water in a meter is too low, it is renewed from a reservoir which is on the side of the meter at the top. There are periodical examinations of the meters, by two experienced men, who go round together for that purpose, say

once a month, sometimes oftener, particularly in the winter; generally speaking they are obliged to put in some water, showing that the consumer has been using gas not paid for, owing to the water line having fallen below its level.

Cross Examined. Have examined a meter made by Samuel Crosly, of London, and compared it with ours; knew it by the signature and patent mark which was upon it. Also have compared the Edinburgh meters and others made in Philadelphia and in New York. When the Company cannot manufacture meters fast enough to supply customers, they have imported them from England and Scotland, I think. Sometimes if a hole happens to be in the cylinder, the register will not work for three months, and in every such case the Company is in the habit of making out bills to the consumer, by estimate, and present it to him so marked, with an explanation of the reason, and if he disputes its correctness, they leave it to him to say how much it ought to be, or not to pay any thing, as he pleases.

The meter in the entry was made by Milne of Edinburgh; his meters are very celebrated; he is the greatest manufacturer of the article in Edinburgh.

Uriah Boyden. Am a civil engineer and mathematician. Have taken a measurement of the gasometer in the entry, this morning. It contains two feet four one hundreths, eight one thousandths, (2.048) cubic feet, when the cylinder descends the whole length of the scale as it is now graduated. Have calculated it once. Witness was requested to examine his calculations, or to make them anew, which he did in the court room, and afterwards pronounced them to be correct.

Experiments were then made of the gasometer and the proof meter, the court, jury, counsel and parties all proceeding to the entry for that purpose. The experiment was made by passing two feet of air from the gasometer to the proof meter, and the index or register showing as it moved an exact conformity to the scale of the gasometer.

On returning to the court room,

Mr. Stearns was recalled, and testified that the Company is not in the habit of charging on their quarterly bills the odd ten feet registered, nor of taking any notice of the quantity less than ten, except when a customer discontinues taking gas, and then they generally make the bill out for the whole quantity.

Mr. Chase, for defendant, asked that the meter and gasometer in the entry might now be examined and compared with gas instead of air, as he was not satisfied with the experiment just made. The plaintiff readily complied, and his

workmen were immediately directed to affix proper burners, get the gas in readiness, and make the experiment. But as it was near two o'clock, P. M., the usual hour of adjournment on Saturdays, it was arranged between the parties and the court, that the jury should be placed in charge of an officer, to be discharged when they were satisfied with the experiment. And the court then adjourned to Monday.

MONDAY, JULY 31, 1848.

Mr. Slader recalled.

MR. CHASE objected to any more evidence on the part of the plaintiff, as it had been understood by him, on Saturday, that the plaintiff's evidence was closed. The Court decided that the evidence might be admitted.

Witness had several times tried experiments to ascertain how much gas burners would consume; he had never tried to get at the lowest quantity, but he had examined the flame at several different heights. The common Argand burner, with the flame three quarters of an inch high, would consume two feet an hour; at one and a half inch, three feet; at two and a quarter inches four feet; at three inches five feet; at three and three quarter inches six feet. If a short glass be taken off and a taller one put on, the flame would be raised and more gas would be burned. Less than three quarters of an inch flame can be burned, and the amount can be reduced almost down to nothing, but witness never tried how little.

MR. CHASE admitted one sixteenth of an inch, stating that he had tried it.

Witness. If the flame should be reduced to about half an inch, it would, in my judgment, burn about a foot in an hour, but I never tried it; but I can form no judgment how much one sixteenth would burn.

Cross Examined. At one sixteenth of an inch the gas would burn in the same proportion as at half an inch, if the meter was in order. Don't see why it should not. It would take about eight hours to burn one foot, at one sixteenth of an inch, if it takes one hour to burn one foot at half an inch.

TO WHITING. The argand burner shown to witness has thirty-six orifices for the gas to pass through. We have several kinds of burners, with more or less orifices. The more orifices there are the more gas will be burned in a given time.

Cross Examination resumed. We have five or six different kinds of burners. This one, the argand, with thirty-six holes, has been in use nine or ten years. We usually put

these into stores, unless the occupant has a preference for another kind. The fixtures in Gault's store, if I recollect right, were not made by us, but by H. N. Hooper & Co.; if so they were put up by request or order of the former occupant, or the owner of the premises. We generally put up our own burners when we put in meters. It is not my business to put up burners or to know whether they are put up by the Company; but I do know sometimes. I don't know whether Gault procured any burners of the Company. Have seen his burners, but never examined the orifices.

Cannot state whether burners with globes burn more gas than those without, nor whether they burn less; the globe does not reduce the flame; the globe is not so high as the chimney, generally by half an inch, and sometimes the top of the globe is two inches lower than the top of the chimney. The globe does not alter the consumption of the gas. The height of the chimney does not affect the consumption of gas unless you alter the stop-cock; you can burn more gas with a tall chimney than with a short one, if you choose, and alter the stop-cock for that purpose; there is greater draft in a high glass, but no difference in the consumption of gas, that can be perceived, unless the stop-cock is altered; I have tried it on the Gas Company's premises and never saw any great difference. Do not know of my own knowledge that this pattern of burner and glass is different from those in Gault's store.

Mr. Whiting admitted that if the light shines through two glasses, especially if one of them is ground, it would take more gas for the same radiation of light; he was willing to allow that the use of a globe necessarily requires the burning of more gas, and those who use globes burn more on that account.

Cross Examination resumed. Suppose the flame to be level with the top of the chimney; the placing a globe over the glass would neither alter, increase nor diminish the flame, and would not perceptibly alter the draft that I know of. The object of using globes is different with different people; some use them to soften the light, some to make more show in their stores and in their windows.

Have never heard it remarked by customers that more gas is used with globes than without, to any present stockholder, or agent, or to myself as a meter taker, nor has any such thing been admitted by me. This is the common size of the burners in use in Washington street; if a chimney with a larger diameter were used, no more gas would be consumed.

To Whiting. When the fixtures and pipes leading to the

burner get filled up, as much gas cannot be burned, nor will as much pass through, as when they are clean. When they get foul we are sometimes obliged to put up new ones, and sometimes we can clean them out. When a customer complains that he does not get light enough, we enlarge the fixtures, or make larger orifices. Do not know whether Gault's fixtures have been altered. The quantity of gas burned with a globe depends upon the state of the stop-cock; the fact that people do burn more with a globe may be from their not seeing so readily when the chimney gets foul, and that more gas is required then, and that it requires more to give the same light through ground than through plain and clear glass. Have seen the flame rising to the top of chimneys covered with globes when it was not necessary; the flame cannot be so readily adjusted to the desired height when it is hid by a globe. If the stop-cock is in the same position with a long, and a short chimney, no more gas would pass through; but with a long chimney the flame would burn longest, and best, and clearest, and with the most perfect combustion.

Cross Examination resumed. The taller chimney consumes more perfectly, but no more gas. There is more apt to be smoke with a short than with a long glass. Thin gas will evaporate most and cause a loss to the consumer.

Mr. Chase then opened the defence as follows; —

MAY IT PLEASE YOUR HONOR AND GENTLEMEN OF THE JURY.

The sum in dispute in this case, seemingly unimportant in itself, is yet of as much importance to my client as to the plaintiffs here, and the question is whether that, and a much greater sum in the shape of costs, shall be transferred from his pocket to the pockets of the Boston Gas Light Company, the plaintiffs before you. The question in fact is of great importance, and you will allow me to explain why. Though a small question as to the dollars and cents involved, it comprehends a question of immeasurable value to my client, to all consumers of gas in the city, to you, gentlemen, and to the citizens and public in general.

And it is the question whether a citizen who not only conscientiously believes, but morally knows, and not only that, but can demonstrably exhibit that he is charged more, week after week, and quarter after quarter, than the worth of the gas he uses, can be compelled to pay whatever the Company may see fit to charge or demand. And, as I said, it is a question which greatly concerns the defendant, yourselves, and all the community.

Now in this particular case the defendant comes before you asking the plaintiffs to prove their case against him. You know that for more than two days past they have been endeavoring to make out a *prima facie* case against us, and on Saturday stated that they had closed it. But to-day, this very morning, they have put in further testimony, have done their best to strengthen their position, and now, after all this effort, I put it to you, I ask you whether they have made out any such case as can give them a right to demand of you, or can authorise you to give any verdict whatever against the defendant. I say that the case the plaintiffs have here presented will not justify you in giving one farthing's damages against my client. The Court will instruct you, gentlemen, that every averment in the writ is bound to be proved beyond a reasonable doubt, in the mind of each and every juror. If in any single department the plaintiffs have failed so to do, their case must fall. If they fail satisfactorily to show —

1st. That they have charged us by the most usual measure of gas consumption; —

2d. That from October to January last, we actually used the gas charged against us; —

3d. That our gas fixtures were all correct and in good order; —

4th. That the gasometer and meter are the only true measure of gas consumption; —

In all, or either of these cases, the verdict of the jury must be against them. Or if we show that their measures are not accurate, or if they fail to prove their entire accuracy, then again they cannot recover. And here, gentlemen, the burden of proof is upon them.

On any one of these grounds, and on all of them together, we ask you, gentlemen, for a verdict in our favor. We contend that nothing at all has been offered in evidence to remove any conscientious doubts you may have entertained as to the accuracy of the plaintiff's measurements — doubts which we think you all must entertain — doubts supported by your own knowledge, confirmed by your own experience, and borne out by the experience of the whole public.

We say the plaintiffs have no case at all. You have repeatedly seen, gentlemen, in the course of this trial, that the Court has admitted testimony which it did not think belonged to the case, except perhaps, as we say at the bar, *de bene esse* — that is, testimony to be put in, but not to be considered by the jury, except under the express instruction of the Court.

The Court has said that it was at a loss to see what a large portion of the evidence had to do with the case, but it was admitted on the system my learned friend, the counsel on the other side, contended for, as being a link in the chain of evidence by which he proposed to substantiate his case. But we say he has not made out even a *prima facie* case, and by that we mean this;—that though he has presented what he calls a case, surrounded by all the adjuncts his abundant ingenuity could contrive, strengthened by all the fortifications his exceeding shrewdness, ability and talent could heap around it, yet there is nothing in it. He has brought up and displayed before you, all his iron, his brass, his copper, his gray-haired men, managers and directors, his clerks, his book-keepers, his measurer, and his collectors,—you have seen how they have sworn for the plaintiffs, the reluctant, tergiversating manner in which they confessed to every thing that could possibly tend on the other side—you have seen and noted all of this.

And you know, too, the position of my client—forced to trial while yet unprepared, and with counsel called in only at the eleventh hour. Still we shall endeavor to do as good battle as we are able, though but little can be expected of us against counsel no less distinguished for powerful eloquence than perfect urbanity of manner, who always takes by storm the jury, foreman, each member and all, and whose captivating graces of manner and style lead the whole audience at his heels. We can only oppose to so powerful a force the efforts of a poor undistinguished knight, and must rely upon the justice of our cause for the want of ability in its champion. But we are confident, gentlemen, that, in your hands, the right is safe.

My client comes before you not unwilling to pay this bill, if justly due, nor indisposed to fulfil any obligation that fairly rests upon him. Neither does he plead inability to pay,—for though, before a Western jury, in many cases, if a man were to show that he could not pay a debt, the verdict would be that he did not owe it, yet that principle does not obtain here. Every one knows the contrary. But he comes before intelligent men—and without pretending to heap upon you, gentlemen, the customary compliments—without saying that you are the only honest men, or the most honest men in the community—without attempting to elevate your characters till you stand, as it were, the Bunker Hills of humanity—he comes before you as intelligent men, fully capable of deciding the point, and the only point, at issue here. And that is—why should he not be compelled to pay this

bill? And besides the general reason I have urged, let me tell you some other reasons why he should not.

I have asked, have the plaintiffs in any way shown that we ought to pay this demand, and I say they have not. Why, gentlemen, they themselves only set forth a pretended test as a reason why we should pay. They say to you that a certain meter which they produce, and allege to have been used in measuring our gas, is a true test of the amount we have consumed. But here, I say, comes in the law of the State, and I plead it not as an avoidance of their claim, but as a full and total discharge of this whole bill. Because they are bound to come here and fully prove the correctness of the measure by which they charge us, and they must not attempt to take advantage of their own wrong. And yet they have never even pretended to show that that measure is in accordance with the statute of the Commonwealth; and this single fact I contend is a precipitation of their whole case from the elevation where they have attempted to place it, down to the very bottom. And on this ground I fearlessly ask a verdict for the defendant. The statute of the State provides, under an express penalty, that no flour, wheat, grain, &c., "*or other goods or commodities*," shall be sold unless by measures or weights under seal of the proper officers of the Commonwealth. We say now that this Corporation is not exempted by its charter from the operation of this act, and we say that where there is no exemption, then the law imposing a penalty operates as a prohibition against all sales not in compliance with its terms, and that in itself is a bar against judgment in favor of any transgressing party.

But they say the standard by which they measure and charge our consumption has been proved, that is, compared and adjusted, by their regular proof meter, as it has been called. Suppose it to be so, still it is not the more proved to be a legal standard here. For though it may correspond precisely with their Scottish or English standard, still they have not shown by any Exchequer certificate from the foreign government that such is a proven and correct standard. And we say moreover that there can, in the present nature of things, be no absolutely true test or standard in a case like the present; for the accuracy of these meters is constantly varying, on account of their position, the use they are put to, the alteration of the pipes connected with them, and a thousand other circumstances. And we all know that no human machinery — that is, no machinery, the work of human hands — has ever yet been made perfect. No clock, no chronometer of the most delicate conceivable workmanship,

can mark the lapse of time with the fidelity of the sun's progress in the heavens. The calculus is as necessary as the telescope to the mathematician and astronomer to correct the aberrations of the stars themselves. The first astronomer and mathematician in the world has said, that in these things he is "all at fault." How must it be then with these paid men — these servants of this Corporation — in this case! How shall they pretend to be umpires or competent judges of the accuracy of a machine like that before you! Any such pretence is a fable. It is false. It is ridiculous. It is absurd. And it must be mortifying to my friend who sits near me, (Mr. DARRACOTT) with the gray hairs of wisdom upon his brow and the stores of scientific experience in his mind, to be brought into court in a case like this, sustained by evidence like this. I am happy to know, gentlemen, that he frankly says he hopes he never may be again.

But, furthermore, we shall prove that the same amount of gas has been charged differently when burnt at different places, and that the Company's measurements are a matter of mere guess-work, as they themselves have oftentimes confessed. They render in their bills by estimation, and their customer, being an honorable man, pays them if he thinks the charge reasonable. If not, he appeals to the Company and they reduce his bills to whatever amount he says he ought to pay. Sometimes they throw their charges in entirely. And it has been stated to you that this is the very first case ever brought into court for adjudication. Why is it the first case? Not because, like other corporations, they would not wage war with heaven and earth to obtain the last mill due them — but because they do not know what is due them. They know that their meters are no test, and they throw in their bills when they can't collect them peaceably, because they know on what a bruised and broken reed they depend. They know that if they were to show their hands they would meet with the same luck in court as the Gas Companies in New York and Philadelphia, which sell the same kind of article by the same sort of measure, have recently met. But here they have done what they could to support their claim. We shall now do what we can to disprove it. Without further detaining you in opening, gentlemen, I will proceed to call our witnesses.

MR. CHASE then called the witnesses for the defendant, who testified as follows:

Samuel O. Aborn. Have been a consumer of gas from the Gas Company a little short of two years. Have a bill

receipted from October 1, 1847, to January 1, 1848, for $43.40; it was paid by my establishment. Have used fourteen burners on some nights — Saturdays; and on other nights twelve burners. We light up at the usual time and shut at half-past seven to eight o'clock, except on Saturdays, when we keep open until ten o'clock, to half-past ten. Five o'clock was the usual time of lighting throughout the quarter. We use globes. Cannot say whether consume more gas with globes than without, as I never made the experiment. Have one burner with neither globe nor chimney; it is in the form of a sun. Don't know whether it burns more gas than others or not; should judge it to have about the same number of holes; it gives rather more light; it stands in the back ground, (in window) and has no greater draft that I know of; it may be that it gives more light in consequence of the reflection; am not competent to say whether it burns more than other burners, but have been told that it does.

Cross Examined. While I took the gas had a large meter put in because the smaller one was not big enough to give sufficient light, but had no larger pipe in consequence. I still take the gas. Am a hatter. We light nothing but the ware-room, or store. Had clerks during this quarter. I was always the last person to leave the store. I have two keys, of which I keep one and the boy the other. My store is at No 95 Washington street. I never left the boy or any one else behind me there, but always staid until the door was locked. Probably we lighted a little earlier when it was dark weather than when it was clear. In October we generally light up at five to half-past 5 o'clock, and in December at half-past four. Don't think we lighted earlier in cloudy weather, but cannot swear we did not. All in the store were accustomed to attend to the gas and regulate it, if too high or too low. It is possible that the boy might have gone into the store when I was away, but it is not probable. I had three or four young men, workmen or clerks; none of them could have got in without the boy or myself knowing it. The boy came to the store in the morning and swept it out; I can't swear that I was always there as soon as he was, nor that he did not burn gas to see to sweep out by. It was his business to sweep out. I cannot swear that he did not light the gas before I got to the store, but do not think it probable. Don't know that the boy did not let in the clerks to read, &c., after I went away at night. Occasionally I stayed until a quarter past eight o'clock if a customer was in, or as business required. The time of closing is always subject to the emergencies of the occasion. Am still a consumer.

Cross Examined. I keep no watchman and no porter. Have no suspicion that any one has been in the store after it was closed for the night. Never heard any remarks from the clerks about each other being there. There have never been any appearances in the morning to indicate that they had. The boy generally opened the store in October at seven to a quarter past seven o'clock in the morning; in November at half-past seven, and in December a quarter of an hour later. I was generally there about that time, and when he was taking down the shutters. Never experienced any smell of gas in the morning except when the pipes leaked, which they did two or three times, so as to scent the store.

William T. Cook. Have used gas for one year and three months. Have a bill from October, 1847, to January, 1848, for $46.90, which is paid. I used sixteen burners on Saturday nights, and generally on other nights fifteen. It was the custom to close the store at half-past seven o'clock, and lighted up about five. Should think that three hours a night was the extreme limit of time that we burnt the gas. We seldom lighted before half-past four, and often later. Sometimes we closed earlier than half-past seven and sometimes later. All the burners have globes except one, and we use that on Saturdays. On Saturdays keep open till ten o'clock.

This argand burner appears to be the same size as mine.

To a Juror. I burn at the full height all the evening. On Saturday nights extra, if we have a hat to dress.

To Chase. Cannot say whether we burn more gas with globes or without.

Charles W. Burbank. Have used gas more or less, for four years. Have a bill for gas from October, 1847, to January, 1848, for 7300 feet, $25.55. Used four burners and no globes. The average time of burning was four to four and a half hours each night; kept no correct account; it depended upon the time we closed the store. From April 1 to July 1, 1848, the bill was $4.20. We then used four burners without globes on an average of two to two and a half hours a night. I don't know whether globes increase or diminish the amount of gas consumed.

Cross Examined. The intermediate bill, from January 1 to April 1, 1848, was thirteen to fourteen dollars. Last year's bill from July to October was, I think, just fourteen dollars. I kept no account of the time we burned the gas, and paid no particular attention to it. I sleep in the shop and so does my brother. We light up the gas usually at dusk, and usually shut up about the same time. No gas has been burned at night when I have been there, and presume not at any

other time. I have no particular knowledge on this matter. I think the statement I have made will not differ materially from the facts.

We usually shut up at half-past nine to ten o'clock. Am a jeweller. The average hour for closing is at ten o'clock in summer. Do not shut up before half-past nine o'clock more than three or four times in the course of a year, and not more than that number of times after half-past ten o'clock. Shut up in winter at ten o'clock, or about that time. Burn the same number of lights both seasons. Our object is to attract as much attention to the store as possible. The only difference is that we sometimes in winter light up at three o'clock, and in the back part five or ten minutes earlier than usual. In winter we shut up earlier than in summer. When it is my brother's turn to stay at the store I go away at half-past six o'clock.

To Chase. From April to July last I was at the store every other week in the evening, every evening, and we used four burners from two to two and a half hours.

Cross Examination resumed. Our store is twelve or fourteen feet in width by thirty-five feet deep; it has no light in the rear. Should think that we lighted up in the shortest days in December at half-past four o'clock; sometimes earlier than at others. Should not think we ever lighted up before four o'clock. We have a burner before the watch bench, but it is never lighted; it may have been lighted, a dozen times and perhaps more; have had it there a year and I have always lighted it if ever it was used when I was there. The store is under the Marlboro' hotel and faces to the east. Don't recollect that we ever lighted up before sundown — never when I was there. I always light up when I think it dark enough, but cannot tell every particular time.

To Chase. I have the same confidence in the bills of October and April. In the April quarter we used four burners two to two and a half hours, and in the October quarter four burners, four to four and a half hours; they might vary in either quarter half an hour more or less.

Charles O. Gove. Have used the Gas Company's gas from January 1st to 6th of May the present year. Used seven burners up stairs and two down stairs. My bill from January to April, 1848, was for 4450 feet $15.40. We lighted up at dark and kept open till nearly eight o'clock, and on Saturdays until ten or a quarter past or half-past ten o'clock. Am a grocer. Down stairs in the cellar there are two burners;

one, in the back cellar, is kept burning throughout the whole day. I use six burners with globes of ground glass. The burners are of the argand form, and I think about the size of the model and the chimney in Court.

Moses Kimball. Am manager of the Boston Museum, and use gas made by the Boston Gas Company. I employed the Indians to perform for me. The bill from the eleventh to the eighteenth of December, 1841, was $20; it was a weekly bill. Don't know how many burners were used; had about one hundred fitted up, and generally used about that number. Keep open every evening except Sunday; we light up at dark and keep open until ten o'clock. In December we commence to light up about five o'clock; we always keep open until the performances are over, and close immediately after, if it is later than ten o'clock.

The Indians were to commence on the 20th of December, and they were to play four nights a week. This bill from the eighteenth to the twenty-fifth of December is $21.00. They played this week five nights. This bill is from Saturday morning to Saturday morning. Am not aware how many burners were used during this time, but they were less than usual; I think twenty-four less than the previous week, and the bill is one dollar larger. I cannot say how long the performances lasted; they commenced at the same hour as the previous week; it was my intention to make the time the same; they closed about ten o'clock; always try to close about that time. The bill from December 25th, 1841, to January 1, 1842, was $23.00. The Indians were there and played all the week; I used twenty-four burners less than usual.

Cross Examined. When we shut off a part of the burners, the others burn more gas unless the remainder are properly regulated; the pressure of the gas is greater on those that are left burning, and throws the flame up higher. Presume the pressure regulates the amount of gas. We generally regulate the stop-cocks; they were on these nights regulated when they were lit up. It is universally the case that when the shops are closed for the night the theatre lights stream up, and we are then obliged to turn the cocks so as to keep the gas down. I have had bills correspond exactly for the same periods of time, but I should be surprised if they were all alike; should not be surprised if they should vary three or four dollars a week. I was satisfied or had reason to believe that these bills for the time the Indians performed were correct; at first I had very great doubt, for I thought I was economizing by using fewer burners, and I blew up about it, but I found I was not economizing. When there is

a dark scene on the stage the man who turns the lights down is obliged to turn down the lights in the room at the same time, or they would stream up and smoke, and burn out too much gas.

To Chase. We burn the lights generally as high as we can, and try to keep them all at the same height. We use the argand burners, like that pattern, There were no globes at the old place, (in 1841,) the burners all had plain chimneys. Presume there is no difference between using globes or not. Have reason to suppose the bills are correct from comparing them with others. Have been convinced since your inquiry. The bill from December 4, 1841, to December 11, was for 4400 feet, same number of burners, $22.00, and for about the same number of hours; from November 27 to December 4, 1841, all the same burners, 4,800 feet, $24.00; November 20 to November 27, 1841, 5800 feet, $27.00. Same number of burners — and used for a greater length of time, as it was Thanksgiving week, and we had day performances during which we lighted up. From comparison with these, I consider that the bills during the weeks the Indians performed, are correct.

Cross Examination resumed. When the performances on the stage begin we turn down the burners down stairs in the Museum part of the building ; most of them are put out. At the old place something more than half the burners were in the exhibition room, so that about one third of them were turned down, or put out when the performances commenced, in order to economize. When the Indians were there we dispensed with the side lights altogether; there were no dark scenes at the old house.

To Chase. One third of the lights were turned down or out, down stairs, when the Indians were there.

George T. Carruth. Have used the gas, made by the Gas Company, about eleven years. The bill from October 1, 1847, to January 1, 1848, is for 2700 feet, $9.45. I was then in a different store from the one I am in now. I used four burners then. Am now a cigar-dealer, but was then a grocer. We lighted up at dark, about five o'clock, and kept open until nine, except on Saturdays, when we kept open until ten o'clock. Used no globes. Don't know the difference made by using globes, nor whether they increase the consumption. Use now the *batswing* burner; by using a chimney should think I would get less light and burn more gas. In the old store, which was No. 10 Blackstone street, I

used the argand burner. I used six burners from October, 1842, to January, 1843, the same number of hours as used in the present store, say from dark to nine and ten o'clock, P. M. and the bill was $25.00. The bills were much larger in the old store than in the new; I attribute it to their (the company) knowing nothing about the meters. In the new store the bill from October to January last, four burners from dark till nine, and on Saturdays till ten o'clock, was $9.45. The bill in the new store from October 1, 1847, to January 1, 1848, (same time) was for eleven hundred feet. $3.85. The stores connect; four burners were used altogether in both stores — two in each store and burnt the same length of time; the two bills make $13.30, for that quarter. Here is a bill from April, 1845, to July, 1845, for 1600 feet, at four mills, $6.40; the bill for the same quarter the succeeding year was for 7200 feet, at four mills $28.80; there were four burners in use part of the time and six a part of the time in 1845; in 1846 had five burners; in both quarters used gas the same number of hours. The burners were not the same. In 1845 I had the argand, and in 1846 the batswing. Should judge that the argand consumes the most gas and that the batswing is the most economical.

Cross Examined. In 1846 had a burner in the cellar; there was no other light except through the sidewalk gratings; that was counted among the five burners I have spoken of.*

TUESDAY, AUG. 1, 1848.

William A. Weeks. Have used gas for five years. Have used it in Washington street since the first of January last. My bill from October, 1847, to January, 1848, was for twenty thousand feet, $70.00; had seventeen burners, and directed my porter to light sixteen of them. My orders to him are to light up at sunset, except sometimes on dark days, when he lights up earlier. In October, I should say, sunset is about five o'clock, and in December about half-past four, on an average. We close at nine o'clock. For three or four nights, at election time, we keep open later, say until ten o'clock, not over four times in all, and not using more than four ex-

*[NOTE. — The subjoined Note should have followed the matter on page 16, at the end of the report of Saturday's proceedings.]

The Judge and most of the Jury then retired to the adjoining room, or entry, where the meter used by the defendant was connected by a pipe with the cubic measure, or small gasometer, measured by Mr. Boyden, and two feet of gas, as measured in the cylinder, passed through the meter. This was repeated five times, and the pointer on the index was moved forward exactly one division, showing that ten feet of gas had passed through the meter. A small quantity of water was then put into the meter, so as to raise the water level; this stopped the flow of gas, and the lights went out; by drawing out the same quantity of water, the lights burnt freely again.

tra hours of gas. Use no globes; the use of globes would make a difference and not a difference in the consumption of gas, I should think — for the same quantity of gas in a globe will not give as much light as in a plain glass, and it is necessary to use twenty per cent. more gas to give the same light. I have used both kinds of glasses, and never noticed that the globe had any tendency to create a larger draft.

Cross Examined. I keep the Whig Reading Room, in Washington street. Sometimes the lights are put out before the time ordered. My directions to the porter are to put them out when the nine o'clock bell is done ringing. Am always at the room on Sunday nights at nine o'clock, and rather more than half the time on other nights, when the lights are put out. Can swear that they are out at nine when I am there, but am not so certain about other times. This bill does not exactly correspond with bill of the year before, owing to some extra care having been taken to have the gas bill smaller. A great deal of gas is necessarily consumed in the room, in order to enable people to read in all parts of it. My orders are to keep the flame up two thirds of the way to the top of the tallest glasses. It makes a great difference in the amount of gas consumed whether the flame is raised an inch or two higher or not. I use the tall glasses, and should think we burn the flame five and a half inches high when we want the most light. I always supposed that burning it two thirds of the way to the top of the tallest glass was the most economical. We are obliged to have the gas regulated two or three times in the course of an evening, according to the pressure. which becomes greater as the shops are shut up. Have seen the flame streaming up and smoking, two or three inches above the top of the small glasses.

I have been a merchant before I took charge of the reading room, and a gas consumer, but I was seldom at my store in the evening, and scarcely knew any thing about the quantity consumed then. I have no doubt that the amount burned depends on the care taken to regulate it.

To Mr. Chase. I have a porter at the room, and gave him directions to close at nine o'clock and extinguish all the gas. From my own knowledge he complied with my orders half or three quarters of the time. The bill from January 1, 1848, to April 1, 1848, was $52.85.

Cross Examination resumed. The last bill is smaller than the other, as more care was taken, and I think two burners less were used. I know that we used one burner less.

To Chase. Have had two porters at two different times, and gave the same instructions to each. So far as I observed they obeyed my instructions. It is a very common thing for the establishment to be left for a short time with neither myself nor the porter present. Believe there is some difference in the length of the days in March and October, they being shorter in March.

James H. Wheeler. Used gas for five or six years. Keep at No. 6 and 8 Central street. Had bills presented while there. Bill from April 1 to July 1, 1846, has not been paid; it was made out to J. H. Wheeler & Co.

At this stage of the evidence witness was proceeding to state that the bill was for gas which he never had, as he did not burn any in the store. He was stopped by Mr. Whiting, with the remark that if he could produce any bill for a time when he did not use any gas, and would make the fact apparent, he, Mr. Whiting, was authorized to give him a check for $500. The Company had heard of such statements before, and had offered a reward of $500, to any one who would prove, or even make his own oath to such a fact. The Court decided that Mr. Wheeler's statement of the contents of a bill was not evidence, so long as the bill was in existence, and could be found. Mr. Wheeler left the stand to go to his store for the bill, but did not return to complete his testimony.

George F. Johnson. Have used gas at No. 25 Bromfield street, about one year and three months. Am a fish dealer. Use one burner every night till eight o'clock, and sometimes till nine. On Saturday evenings use three burners. For the first quarter used on three Saturday evenings four burners. Bills average from $7.00 to $13.00 per quarter. On Saturday evening keep open on an average till ten o'clock. Think the last bill was $11.00, but am not positive.

William C. Hibbard. Am an engineer; my business has been connected with steam engineering for eight years past. Have seen meters of the Gas Company, but never examined one till yesterday, when I examined the models in Court.

To Whiting. Have never been through any college. Have been educated at a high school and a country academy. Have had a practical education. Am a draughtsman, and was till within a year or two with Otis Tufts. Have been for many years a draughtsman of steam machinery, and have superintended the construction of machinery. Was brought up in a machine shop and worked on machinery. A year

ago last summer I devoted my time to getting up and preparing a new series of machines for hemp spinning, and last year was engaged in manufacturing machinery for the Marblehead Cordage Factory. Have also devoted some time to drawing specifications for patents, and making drawings of machinery. Believe myself competent to give certain reasons and opinions relative to gas, and the operations of gas machinery. Think myself competent to instruct others, from my knowledge as a mechanic and machinist. The principal operations can easily be seen by a mechanic. My knowledge is scientific on this subject and not practical.

Mr. Whiting, without expressing any opinion, called upon the Court to decide whether the witness was competent to give evidence in this case.

The Court ruled that he should be allowed to proceed.

Examination resumed. A gas meter, if in order, can be made a just measure of capacity. But gas is dense in proportion to the pressure; a just meter will measure a foot of dense as well as a foot of rare gas. To make a meter a just measure, it is necessary that the pressure on the gas as it passes through the meter should always be the same. Gas when sold is supposed to be of a certain density, and in proportion to its density, is its illuminating power. A given quantity of rare gas will produce a given quantity of light. A meter will register equally well the rare gas if the pressure is sufficient to turn it. In case the pipe leading from the main pipe to the building is not large enough for the burner, a certain amount of the initial force of the gas as it leaves the gas house is consumed in friction as it passes through the pipes, and that friction is inversely in proportion with the quantity passed through, and the rapidity of circulation. The result would be that a meter consuming out of the main near the gas house, would indicate a greater degree of density and the consumption of more gas than one at a more remote point. And if the gas main is too small for a proper communication with the meter, that is, if the current must have greater rapidity, the difference between the initial and terminal points will be considerable. If the gas be more dense, a cubic foot contains a greater quantity, that is, of illuminating power. A cubic foot does not necessarily indicate any thing but the pressure. The meter registers the same number of feet whether the gas be rare or dense, but the difference is in the illuminating power. Consumers at the most remote points would pay more for gas than those near to the gas house, because they would take it at a lower pressure, and the friction has affected it.

There is a difference in the illuminating power in different gases. Rosin gas has much more illuminating power than coal gas, though it would register the same number of feet under the same pressure. I don't consider that globes have any influence upon the consumption of gas, only on the degree of illumination, having a tendency to obstruct the light.

Cross Examination. The gas used by the Gas Company I suppose to be made of coal and rosin; (45 parts carburetted hydrogen, and 55 parts of pure hydrogen.) Suppose the street mains are large enough to pass all, and more than all that is used at all times. There must be some appreciable difference in density, about equal to half an inch of water. If there were two gasometers or gas-holders, one at each end of the City, as in Boston, the points of greatest density would be at each end, and the lowest would be in the centre. Am not able to tell from actual experiment the different pressure at different points, in the mains of this Company. I speak only on scientific principles, and not from practical knowledge.

I don't recollect the actual weight of a cubic foot of carburetted hydrogen gas. The difference between one inch pressure and one and a half inch is appreciable according to the law of gases. Gas cannot be burnt at atmospheric pressure only; hydrostatic pressure must be put on to it, to make it flow. The specific gravity of gas is forty-five to fifty hundredths of atmospheric air. There are other kinds of meters mentioned in the books, but I don't know any other practically than the water meter. Water is compressible theoretically, and may be measured at different densities without difficulty. All measures are necessarily subject in some degree to imperfections. Wood will always contract from greenness to seasoning a quarter of an inch in a foot. Iron or tin will contract from thirty-two to two hundred and twelve degrees of heat, one sixty-fourth of an inch in a foot. All measures are imperfect in fact. If measures are sealed exactly to begin with, they will become imperfect by use, by indentations and by attachment of extraneous matters, such as dirt, &c.; but in general the differences from these slight causes are not considered of any practical importance. Practical accuracy is relatively important according to the value of the article measured.

To Chase. If a flame three inches high is turned down half an inch, I should *not* think that the recoil would operate on the meter like back water on a water-wheel; should think it would not make any appreciable difference. If the posi-

tion of the meter as to its level is changed it varies the water line, and of course varies the quantity of gas which passes. It is necessary that the meter should be level.

Cross Examination resumed. If the water in the meter goes off or evaporates and is diminished, the consumer gets more gas than is registered and more than he pays for. Provided the quantity of water remains the same, and the shelf on which the meter stands is canted one eighth of an inch, it shows no material difference in the quantity of gas used, if it does not alter the mean water level. If the meter is canted one way the error will be in favor of the Company, if any, and if canted the other way it will be in favor of the consumer, if any, but the amount of error in favor of the Company is much less than that in favor of the consumer.

Ira P. Beecher. Am a machinist, and have been ever since I was large enough to work. Am now at South Boston, engaged with the Sylvic Gas Company. Examined these meters yesterday. Am not practically acquainted with the Philadelphia meters, but have examined plans and drawings of them. Have worked as a machinist in Philadelphia four years. Was not engaged with any Gas Company there. Have examined the machines on the table. Have put up apparatus for sylvic gas in Virginia, and one at the Astor House, which is now in operation. Never worked on meters, but have made it my business to inquire into their construction. Never put up fixtures, but have put up works for generating gas. Have seen a meter taken to pieces in our shop, but not one of the meters of the Boston Gas Company. Feel competent to give judgment as to the accuracy of a gas meter. There is an inherent inaccuracy in every meter that is made on account of the difference in the pressure of the atmospheric air. It is not possible for a meter to be made that will be a perfectly accurate test; they will not indicate the different densities at which gas passes through them; there is no other cause of inaccuracy than the pressure so long as a meter is in order. A meter indicates the same amount of gas, under a pressure of one or four inches, though a greater amount should be passed, on account of its being more dense. Could show to the jury by the machine that a difference in pressure would make no difference in the registration.

Cross Examined. The meter is the only measure of gas known, and in common use. We put them in for sylvic gas when people wish us to do it. The most perfect mode of distributing gas at an equal pressure, is by a gasometer at both ends of the city. If the mains are large enough,

and there is a gasometer at both ends, there will be no material difference in the pressure at different points on the line.

George F. Johnson, recalled. Have found one of my bills. It is from January 1, 1847, to April 1, 1847, for 2150 feet of gas, $7.35. Am not certain that my bills might not be less than $13.00 at the largest, in a quarter. During this quarter (from January to April, 1847) burnt one burner every evening, and three on Saturdays. We light up at dark, and burn generally till about eight o'clock, perhaps till half-past eight, and on Saturdays till half-past ten on an average. Use the ordinary argand burner.

Jesse Bradshaw. Have used gas for parts of about eight years, at No. 9 Marshall Street. Usually had five burners in use in the upper shop, and two in the lower apartment. Used the round (Argand) burners. The bill from October 1, 1843, to January 1, 1844, was for 7,800 feet, $39.00; it is not paid; have not been sued on it; used during this period, five burners in upper shop, and one below, not over a fortnight in that quarter. Can't tell exactly how many hours I burnt the gas; commenced generally about dark — at five o'clock, and shut up about nine, except on Saturdays, during the first half of the quarter, and at half-past eight the other half; on Saturdays, closed about ten o'clock. The bill from October, 1841, to January, 1842, was for 7,200 feet, $36.50, at five mills a foot; during that period used five burners up stairs, and two below; a man worked down below all that quarter as much as four nights a week; can't recollect how many hours; one half the quarter kept open till about ten o'clock, and the other half till nine; on Saturdays, always kept open till ten o'clock. Don't now take gas of the Company.

Cross Examined. Think I was not absent at the closing of the shop, more than two or three evenings in the quarter in 1842. The other quarter was there every night, and always was the last man there, and very particular. My business is to make and sell confectionery; work down cellar and used gas when necessary. Have had a difficulty with the Company. Don't know that they shut off the gas. Don't know why the meter was removed; it was kept in another cellar; it was thought best by Mr. Darracott, about two years before that, to remove it from my cellar for some reason. There has not, to my knowledge, been trouble all along with the Gas Company.

To Chase. Believe Mr. Davis presented both these bills.

James S. Byrnes. Have used gas made by the Gas Com-

pany, from November, 1847, until now. From November 20th, to January, 1848, my bill was for 4,200 feet of gas, $14.70; used seven burners of the flat kind; commenced at the usual lighting time, and always kept open till twelve; generally lighted up about six o'clock. The bill from April to June, 1848, was for 6,400 feet $22.40; average six burners; kept open till twelve o'clock; commenced at lighting time; average use of gas, from five to five and a half hours. The bill from January 1, to February, 1848, was for 3,400 feet, $11.90; used six burners on an average; had more than were used; perhaps the avcrage use was seven hours and a half, but cannot tell exactly; commonly lighted up at the usual lighting timc, and always kept open till twelve, sometimcs till one o'clock, and sometimes a little latcr. The bill from March to April, 1848, was for 4,800 feet, $16.80: used between five and six burners, averaging five and a half, as I sometimes used five, and sometimes six; used the gas from five, to five and a half hours. Shut up at different times, all the way from twelve, to half-past one o'clock, as occasion called; commenced at the usual lighting time; always remained to see the lights put out, unless I was sick. Have never seen the inside of a metcr, till I saw this in the Court room. Have examined the level of several meters in different parts of the city, at the request of Mr. Gault; did it yesterday. The following is the rcsult of my examination:—

At the Adelphi Theatre, I found two meters fixed on separate planks; the first and smallest was over the ticket office in the second story; it was from two eighths to three eighths of an inch out of horizontal; I used a spirit level; it pitched from the screw, and one eighth of an inch towards the index, or forward from the wall. The second meter pitched a large three eighths of an inch the other way from the horizontal; it was so near perpendicular that I called it straight.

I thcn went to the Howard Athenæum, where I found threc large meters, all, I should think, of a size, and four or five times as large as that on the table; they were perfectly level on the platform, and I could not see that they varied a hair.

At No. 9 Howard Street, I found a meter which was canting two eighths to three eighths of an inch from the horizontal, from the screw, and pitched about one eighth of an inch from the perpendicular — in towards the wall, or backwards.

I then went to No. 45 Washington Street, and found that meter level both ways.

I then went to Mr. Gault's store, and found the platform shelf was loose from the wall on the bottom side; the shelf is hung on two brackets; the shelf pitched a little towards the wall; it was in Mr. Ross's cellar, under Gault's store; there is another meter there.

At No. 30 Washington Street, there are two meters; one was perfectly level, and the other was a large three eighths of an inch, out of horizontal (side), but was about correct in other respects.

At the Boston Museum, there are four meters; three are on one platform under the stage; two of these had three eighths of an inch pitch from the screw (sideways), and the other half an inch towards the screw; I forgot to try the vertical pitch of these three. The fourth meter was in a little closet in the office; I put the level on as well as I could, but it was too long for me to be exact in measuring; as near as I could ascertain, this meter pitched three eighths of an inch side-ways, from the screw.

The meter in the Court House I found level every way.

I am acquainted, somewhat, with the operation of back water on a water-wheel; it tends to take more water to carry the wheel round the same number of revolutions. Have had nothing to do with gas works. Should think that the recoil of gas does have an effect on the revolution of the wheel in the meter similar to that of back water on a water wheel. When gas is passed in under a heavy pressure sufficient to fill the meter, the throwing in of more, would be likely to stop the buckets, so that the index would not turn. The operation of back gas would not put the index of the register back.

James T. Johnson. Have used gas for twelve years. Keep at No. 56 Hanover Street. Used to burn six burners, but within a year have burnt five. I never had a bill smaller than ten dollars. The bills vary, and are sometimes small and sometimes large. The meter has stopped sometimes, and they could not tell how much I used, and had to guess at it; it was a year ago; it stopped twice; don't recollect which quarter it was; the first time was about this time of the year; a man came and took the meter away, and the collector said he would average my bill by other months, and if I was not satisfied, I need not pay any thing. I pay my bills once a month. Six or eight months ago it stopped again; an estimated bill was brought in, although the meter had not told any thing; I had used the gas. The man took the meter away, and put in another. I used gas from dark to twelve o'clock.

Samuel Skimmins. My business is that of a clothes cutter. Was with Mr. Gault two years and eight months, in School Street. Am not now with him. The bill from October, 1844, to January, 1845, was for 2,400 feet, $9.60. We used three burners, of the common Argand pattern. We lighted up about five o'clock, and closed about half-past nine or ten o'clock. The bill from October, 1845, to January, 1846, was for 2,400 feet, $9.60, the same as the other; was then in the employ of the defendant; we used the same number of burners, lighted up about five, and closed about half-past nine or ten o'clock. The boy closed a part of the time, and I a part of the time. I was present, generally, when the shop closed. The bill from April to July, 1845, was, for 800 feet, $3.20; we had the same number of burners: lighted up about half-past six o'clock, or when it was too dark to see to cut patterns, and shut up at nine to half-past nine o'clock.

Cross Examined. Suppose we generally lighted up about half-past six, as soon as it was so dark we could not see to cut — suppose it was about sunset; it is a matter of some uncertainty as to the time we lighted up. Don't know how long is the longest day in the year. Don't know when is the longest day in the year, but suppose it to be about the latter part of June. The shop was darker than other shops. If the day ended at eight o'clock, we lighted up at half-past seven. I left Gault in the fall of 1846. Have had no conversation with him about this matter.

Otis Foster. Have been in Gault's employ two years; am a cutter; have been with him in Washington Street. The bill from October, 1846, to January, 1847, is, for 6700 feet, $26.80. I was with Gault at that time. I paid that bill at his request; he was sick a-bed; paid it at the Company's office, and stated at the time that Mr. Gault thought it was out of the way, and asked if any deduction could be made; was told that there could not be; something else might have been said, but I don't recollect; I said this at Gault's request. We had six burners during that time with globes; we lighted up from half-past four to five o'clock, and kept open till ten to half-past ten; all the burners were in use. I was in Gault's employ last fall from October to January; we used then from three to four burners, not over four — the same burners as the previous year, but without globes; we use more gas with globes than without; am obliged to turn the stop cock up higher. Lighted up about half-past four to five, and kept open till about half-past eight. Was in the shop every evening when it was closed, and

when it was lighted up. It was not the eustom or praetiee for any one to go into the store after it was elosed for the night. There were six burners in the store, and I think that they were never all lighted at one time. We sometimes lighted three and sometimes four. We had two in the window, two in the centre, and two at the baek of the shop. Sometimes we lighted none at the baek end. When business required a light in the cutting room, we lighted a fourth, bnt it was not a common thing last fall. Did not light up a fourth exeept for the purpose of eutting. We had a neeessity for lighting the fourth perhaps half or three quarters of the time: did not light it at the same time with the others. It was my duty to light and take eare of the gas. I acted under instructions; my custom was to keep the flame up half way to the top of the chimney. My particular attention was called to the gas this quarter, on aceonnt of last year's bill, and the fanlt found with it. There was not so much gas burned last year, as the year before, and the height of the flame was not kept so great. My attention was directed to it by Mr. Gault, and I took particular pains to economize, and to see how mueh gas was used. Don't rccollect any instance before that time that I had any partieular instruetions. Globes were nsed in the front window as the year before, but all the others were taken off; four only were taken off.

Cross Examined. Don't reeolleet any thing about a difficulty in the fall of 1846, with the burners in the front window. Will swear they were used in that quarter. At first they were plaeed so far front as to be in danger of setting the goods on fire, and they were moved back; I can't tell whieh fall it was. They stood so near the window that they could not be used, for three or four months after we moved in, before they were moved. I think we moved in about the last of September, 1846. Have heard Mr. Gault say that they were so near the window they might set the goods on fire. He did use them. They were afterwards set back four to six inches. Was then learning my trade — serving my time as a tailor. Am still in Gault's employ. Have heard from time to time of this diffienlty with the Gas Company, but not lately. Have had no talk of any consequenee about it sinee this suit eommenced. What little has been said about it was a week or two ago; perhaps half a dozen times we have talked about it. Mr. Gault has spoken to me, or I to him, I presume, a few times; can't say how many. During the last week he might have said something in the shop about it, but not within the last three days. He made

no very great talk to me, nor I to him. Before this time till within a week, he never talked about it. Have seen him every day, perhaps not more than ten minutes at a time.

In the fall of 1847, Gault had myself and a small boy in his employ. The boy's business was to run on errands; he swept out sometimes in the morning. I sometimes swept out. Boy swept out at seven o'clock sometimes, and at six o'clock, and sometimes at half-past seven. I was always there when the store was opened. There was but one key, and the boy did not have one. We never lighted gas in the morning. Don't know that Gault had a key. I locked up and carried the key to his house. If he had pleased, he could have gone back to the store after I locked up, sometimes. I boarded in his family, and do now. I eat at his table, and sleep in his house. I pay my board. In the fall of 1846, I don't think we had more gas than was needed to light the store. Last fall we used no more than we wanted, and used all we wanted. Mr. Gault did more business in 1846, than in 1847. Had not so much cutting to do in 1847, as in 1846, and did not need so much light. We had light enough both quarters. In the fall of 1846, ending January, 1847, there was a press of business, and we stayed as late as eleven o'clock. When I stated to the Jury that we closed at ten, I meant ten as the average. We never kept open later than eleven; it always depended on what we had to do. In 1846, Gault had more hands than in 1847. There was less work for two hands, in 1847, than for three in 1846. There was no sewing done in the shop. The shop was for cutting and selling only. The cutting board was in the back part of the shop, and we had to light the gas to cut by. I used to stay till the work was done, say till half-past nine, or eleven. Never took any memorandum of the number of hours we burned gas lights. Never examined the meter. Never knew of Gault's going to the meter, or saying any thing about it. Am not connected with Gault in business; only an apprentice. Have had conversation with Gault on the subject of gas, but not about this bill before this week; can't say how many times we have talked about it.

To Chase. Understood that the meter was in the cellar of the next shop. There is no entrance to it from Gault's shop. There is no entrance to it that I know of, except through Mr. Ross's. I believe that this quarter, some one came once to examine the meter, and went round through our back shop into Ross's.

James T. Johnson. My bill from February 1, 1847, to

March, was, for 3000 feet. The clerk told me that if I was not satisfied, I might pay just what I was a mind to pay. No other bill was presented at this time, and I don't recollect any other conversation. I was not satisfied, because I went down and saw the meter, and saw that the Register had not moved. When the man from the Gas Works saw that the meter had not moved any, he said he would average my bill for the last month, and I agreed that he should. He said that if I was not satisfied, I need not pay any thing.

WEDNESDAY, AUGUST 2.

James S. Byrnes. When I examined the meters to try their level, I tried the screws and took them off; with one exception, the water rushed out; I tried both ways, by shutting off the gas, and by leaving it on; from some, the water streamed out a foot, particularly those at the Adelphi, and at the Museum. Others varied. When a meter is tipped from the screw so that the water would gush out, if the screw should be loosened, think that the register could not indicate correctly, but don't know how it would be.

Cross Examined. I tried the level of the meters by the upper edge, and underneath the shelf or box where I could, but I could not place my level on the top in all cases. I took the water screw off of most of them — one screw from every meter. Took out the under screw at the Adelphi, as well as the side screw, but only one at a time. As soon as the water began to run, I put the screw on again.

The evidence for the defence being all in, MR. WHITING called witnesses to rebut it, viz.: —

John H. Blake. Reside in Dedham. Am a chemist, and have been familiar with the manufacture of gas for many years; have manufactured it extensively in Boston. Have been connected with the Boston Gas Company as manager of its works. Am acquainted with gas meters and the usual instruments for measuring gas. The pressure is different in different parts of the city; it is constantly varying. A cubic foot of gas was always understood to be at 60 degrees of Farenheit and 30 inches of the barometer. If half an inch or one inch of water, or any other pressure be added, it will increase the density. A cubic foot as indicated by the meter will always be more than a cubic foot of gas, because it is *always* under a pressure, and a correct meter can never indicate or register more than passes. If the meter is in order, it is impossible to register more than actually passes through. When the gas is at a certain degree of pressure in

the mains and service pipes, the pressure of the gas on the water in the meter would always force the water out of the side screw hole if the screw should be loosened. If the under screw should be loosened and immediately tightened again before the gas had time to escape, the effect would of course be the same; so that in order to try the true water level in a meter, it is necessary to let off or remove all the gas, and thus relieve the water of the pressure; the operation is like that of a syphon. If a meter tips forward, the gas would be registered less than the actual quantity consumed, and of course in favor of the consumer. So it would, also, measure more if the meter should tip backwards. Supposing the platform on which it stands to be level, there would be not the slightest difference made by having the meter tip a little sideways, or out of horizontal, so long as the machinery works; meters are always proved on a perfectly true level platform, and therefore, when they are put up for use, if they are set on a level they will register truly. Last night I tried a common Argand burner and consumed twenty-three feet and two tenths of gas in one hour, under the ordinary pressure, with the stop-cock entirely open, so that it would flow free. Under extraordinary pressure more would have burned, but the pressure used was the same as is common in all the pipes in the city. To increase the height of the flame does not proportionally increase the amount of light. If a person was accustomed to burn six burners at the best advantage he would be obliged to consume more gas in four than in the six, to get the same degree of light. From the four he would burn it at disadvantage, as he would waste the gas, a large quantity of the carbon passing off without being consumed.

To a Juror. The register in such a case would measure more gas than was burned, but not more than passed away through the meter.

To Whiting. It is impossible to tell the quantity of gas used, by counting the number of burners, as it would be impossible to tell the quantity of fuel used in a house by counting the number of fire-places. When I was manager of the Gas Works it was frequently the custom to light up shops in the shortest and darkest days of winter, at three o'clock in the afternoon; it was very customary to light up as early as four and often earlier. I never made any accurate observation on this point, but I know the fact from seeing the gas diminish in the gasometers, and I have also frequently seen it burning in shops. In the longest days of summer people begin to light up at half-past seven to eight o'clock.

It would be impossible to form a judgment of the quantity of gas consumed by looking at the flame, even by a person accustomed to it, during an evening, and particularly during a whole quarter.

The Foreman here asked the time of sunset on the 22d of December, 1847, and it was established by reference to an Almanac, at 4h. 31m., and the length of the day was also ascertained from the same source to be nine hours.

Cross Examined. It is about a year and a half since I was in the employ of the Gas Company. Have no connection with it at present. Am not a stockholder. Have no pecuniary interest in it. Am nephew to Mr. Darracott.

Any quantity of gas, however small, can be measured by a meter, but the meters commonly in use do not register less than a foot. There are various other modes of measuring gas besides the meter — the gasometer for example. Any vessel that is perfectly tight may be made a measure of gas. There is also the Eudiometer, which is a graduated glass tube. It is customary to weigh gas, but not to sell it by weight. Cannot say that it is not sold by weight in London. It is customary for the manufacturer to weigh it. Light does not altogether depend on density, but two cubic feet of gas being burned, one dense and the other rare, both being made of the same materials, the dense gas will give the most light. Weight is a true test of density. The meter does not indicate the difference in density. I know of no inherent impossibility of inventing a machine for weighing gas, but it is practically impossible to weigh a large quantity at a time for distribution. There are instruments for weighing it in small quantities. Weight would not be a better test of the amount consumed than the present measure by meter. If a meter could be made to weigh gas, it would not supersede the use of the present meter.

Cannot tell how many shops I have seen lighted at three o'clock in the afternoon, but certainly from twenty to thirty. It was two or three years ago, and I have no doubt there were many more. I was induced to observe it particularly because of the danger there might be of our not having gas enough manufactured for the supply that might be wanted. We had many customers who used gas all day long, but not a great many compared with the whole number. The quantity of gas used varies every day.

To Whiting. The pressure in the mains was equal to atmospheric pressure, — a pressure equivalent to a column of water two inches high.

To Chase. Four burners might consume more gas than six, provided the six were burned advantageously and the four were not. In case the gas is burned in glasses set to the height best adapted to the burners, if you reduce the number of burners from six to four, and burn the same quantity of gas, the flame would stream up above the top of the glasses. Globes or burners have theoretically a tendency to increase the draft, but practically there would be no appreciable difference.

Nathaniel W. Turner. During the quarter ending January, 1847, Mr. Gault sent to the office to have the lights in his window moved. I fixed them, and moved the burners nearer towards the window, because they came under a frame on which he hung his goods, as he was afraid if he used the gas, it would set his goods on fire. This was in November. Gault said he had been there most three months, and had not been able to use the gas because he was afraid it would set the light goods on fire. When I went to fix them, they were so one sided that they could not be used without the flame breaking the glasses the minute it was lighted.

Another man, from Henry N. Hooper & Company's, put up those fixtures, and I should not think our gas could have passed down through them, as the fixture was entered into the pipe close up, and then fastened in with putty; no gas to speak of could pass through at any rate. I altered the pendant and fixed it so that it could be used. Gault moved in sometime in September.

Cross Examined. Gault sent his boy for me, — the same one who was here yesterday. Gault himself ordered me to fit it when I went into his store, and was rather severe upon me; this was about the middle of November; he moved in about the middle of September, as I think. He seemed very much offended, and said he had sent to the office two or three times, and he did not see why he could not have his work done as well as any body else. I replied, we have been very busy and probably overlooked it, but I will make it all right now. He said he had not been able to burn the lights since he had been there, as he was afraid he should burn the articles in the window. He said he had been there about three months, as nigh as I recollect. This was about half-past ten or eleven o'clock in the forenoon. The man in the store told me the fixture was put up by H. N. Hooper & Co. The burners did not belong to the Gas Company. There were articles of dress then hanging in the window, and Gault took them down himself. We drill holes in the pipes and screw in the fixtures; or screw them together in pieces;

we never use putty or any thing else, except a little white lead around the screw to make it air tight. There was nothing said to me about reducing the height of the burners by Gault, and they were not altered in length; they were moved in eight or ten inches, nearer to the window, as near as I recollect, which, as there was a jog, brought the pendant down about two inches, but I think not more than that. I should remember if it was lowered as much as six inches; the same pendant was used. I am accustomed to pass by the store five evenings in a week, and I never saw any light in his window previous to that period, on any occasion, but I did see lights in other parts of his store. It was my custom to pass on that side of the street, as our office is on the same side. Gault kept on the lower floor at that time.

To WHITING. I have examined the meters testified to by Mr. Byrnes.

At the Adelphi I found the right hand meter one eighth of an inch higher on the right hand side than on the left; the shelf was an eighth of an inch higher on the back part than the front. If this should cause any error in registering or measuring, it would be in favor of the consumer. The cause of the difference was the warping of the platform or shelf, which is not an unusual occurrence. The left hand meter was a quarter of an inch higher behind than in front; it might have been made so by some one stepping on the shelf. Any error would be in favor of the consumer.

At No. 9 Howard street I could not get at the exact level, but as near as we could estimate, one side of the bench being split down, it was an eighth of an inch out of the way. The pipes would hold up the meter if the shelf was not wholly removed, or was only a little split.

At No. 30 Washington street, the small meter was one sixteenth of an inch out of the way — higher in the rear than in front. There are two meters in that cellar. The large one was three sixteenths of an inch higher on the right than on the left; one sixteenth of an inch higher in front than back, on one end, and on the other end was level. This was occasioned by the mere warping of the board.

At the Museum there were three meters on one platform; one is one quarter of an inch higher on the right than on the left, and three sixteenths of an inch higher in back than in front; the centre one is three sixteenths of an inch higher on the left than on the right, and is level from front to back; the third one is three sixteenths of an inch higher on the right than on the left, and level front and back. In the

ticket office there is another meter which is one eighth of an inch higher on the right than on the left, and the level in the other direction could not be taken, in consequence of its position.

After I fixed Mr. Gault's lights, I am confident that I saw them burning in his window.

Cross Examination resumed. There was a boy present in Gault's store when I had the conversation with him. Andrew Lawder was also with me.

Jeremiah Ross was then called for the defence, but objection being made to any more testimony, the Court ruled it out, and he was not sworn.

William C. Hibbard was recalled by Mr. Chase. The best measure of density of gas, is by weight. Two given quantities of gas will weigh according to their density. This is a general principle, applicable to all cases. A meter might be constructed that would require a certain amount of density to turn it. The amount of light, or illuminating power is in proportion to its density, in a cubic foot of gas, other things being taken in connection or equal; perfect combustion is necessary to make this a true test. If there is a deficiency of gas at the Gas Works, it could be diluted, and by altering the counterpoise on the gasometers, the rapidity of the current would be checked. This would give gas of less density. The illuminating power of one foot of dense and one foot of rare would be the same, but the dense gas would burn much the longest time.

There is no meter I have ever known or read of that will measure the density of gas as it passes through.

The evidence on both sides having now been fully put in, Mr. Chase requested an adjournment until the next day, in order the better to prepare his closing argument for the defence. But this could not be granted, owing to the engagements of the Court.

Mr. Chase, thereupon, proceeded to address the Jury as follows:

May it please your honor and gentlemen of the jury:

Permit me to felicitate you on approaching the beginning of an end of this voluminous case. And permit me, too, gentlemen, to present my thanks to you, and the Court, for the patient endurance extended to my many interruptions of the plaintiff's counsel in the introduction of testimony. That endurance of interruption has answered one end, if no

other. It has shown the difficulty, even to a corporation, of breaking through all rules of law, — of riding rough-shod over all principles of justice — of setting aside the rules which regulate and govern the admission of evidence. The honorable Court has told you that it did not see to what a considerable portion of the testimony amounted, or what a great deal of it had to do with the case; — but that it should yet allow it to come in *de bene esse* — that is, for you to hear, but not to act upon save under the instructions of the Court. And here, also, allow me to say that sad is the day when any well-armed and skilfully appointed antagonist comes into Court to fight a hybrid body — a corporation without a soul, and without a gizzard, even, to feel that it has won a victory or know that it has sustained a defeat; — but still sadder, still darker is that day when one — not with polished armor on his limbs, or with doughty blade even fleshed in glorious strife, but some poor knight, hauled in by chivalric laws to do duty to the oppressed — when such a one should rise to meet a foeman too worthy of his steel, whose skill is alone surpassed by his sagacity, and whose eloquence is equalled only by his urbanity; whose plausibility storms common sense, and whose captivating graces of style drag a jury at his heels. And the more especially, when such a one stands forth as the champion of a body corporate which binds us all by gratitude for its delicious light, and heat-giving joy — which, like the sun to the Pharsee, is not alone a source of heat to our hearths, but of adoration to our hearts. Still such a poor, unfriended knight has come into the lists, will fight his best fight and do his best battle — thinking that it were well done, if, when done, it were done quickly.

Gentlemen of the Jury —

This is an action of assumpsit to recover the amount of $25.55 of the defendant, for burning 7300 feet of the plaintiff's gas from October 1st, 1847, to January 1st, 1848, at 3½ mills per foot.

The plaintiff in his opening set forth these four propositions: —

1st. That the amount of gas consumed by the defendant was to be determined, or measured, by the instrument most generally in use.

2d. That the defendant had the Company's gas fixtures in his store.

3d. That he used their gas. And

4th. That the measure of the gas consumed was accurate.

Now, how does the plaintiff attempt to prove any one of these propositions?

In the first place, *George Slader*, a paid hand of the corporation, is introduced to prove the fact of consumption. He is asked if he knows it, and replies that he does not, except from his book. He then is asked as to his custom in taking off the gas registers — not as to any one particular act, or in any one particular case — but as to his custom. And he tells you that his custom is to take the state of the different meters he examines, and transcribe the figures marked on the indexes to certain columns of a certain book, called a register book. He says that on a certain occasion, he went into a cellar under the store of the defendant, and transcribed from the index of a meter there, the figures entered in the book, 920, indicating 9200 feet of gas. This was his custom — to make these transcriptions and entries every three months. And he finds in the book, an entry, under date of January 5th, 1848, of these figures, 920, from the meter under defendant's store. Well, next the book itself is produced, and what does that show? How does that appear? We should suppose naturally that the gas was charged to the defendant, Gault. But nothing of that sort. The entry stands in the name of John H. Wright and Co. What has that to do with the defendant? And, so, at the very outset of this great and redoubtable corporation's case, its very book of entry bears upon its face, palpable and gross erasures.

But then, to explain this, *Slader* is called upon to state the practice and custom in regard to a change of tenants in places where gas is consumed. And he says that where one man goes out of a store, his name is erased, and the name of the man who comes in is inserted on the book in its stead. In this case the name of John H. Wright & Co., was substituted for that of Gault, because that firm moved in after Gault had moved out. That was the only erasure, he thought. The figures, he was confident, were correct, because they were there. And the learned counsel for the plaintiffs well said that it could not for a moment be supposed that he could tell the state of the meter without these figures. Yet, after all this, how did it turn out? The witness, upon reflection, said that there had been another erasure — that the name of one Mr. Merrill had been inserted and stricken out, as having occupied the premises between the time when Gault left, and when Wright & Co. went in. Gault and Merrill were both antecedent to Wright. Well now, we should suppose that here had been erasures enough. But not so. Mr. *Slader*, on an inspection of the book, came to the

conclusion that there had been tampering with the figures themselves — or, as he said, they had been transposed. But this, too, probably, was done according to custom. This witness did not see Gault there, upon the premises, and does not know that he ever was there. He took the state of the register, he transcribed it into the book, he then handed the book to Mr. Stearns, the clerk, and did not again see it for three months. But now he finds that it has been tampered with. Is such a book of evidence credible? Judge you, gentlemen.

Well, this is the custom then. Three months after the goods have begun to be delivered, this Company begin to charge them. Would any of you, merchants, so do? I think not. But supposing you did, would you go still further and change the names of the people to whom you had sold, and the amounts to which their purchases came? I am sure not. Still less would you plead that such a thing was your custom. Yet here this law-created, law-abiding corporation does that which would blast the reputation of a merchant in a moment — makes a wrong charge of goods delivered, which is bad enough in itself, and, what is infinitely worse, erases the name of the man charged for those goods, and substitutes another and yet another name against the same charge. And this the Company attempt to palm upon you, as being all right, because, forsooth, it is their custom. As if they should not be grateful that their books could indicate but one such case, instead of defending the practice, on the ground that it is their custom for all. But what is worst of all, is that they alter — or transpose, if you please, and as Mr. *Slader* says — the figures themselves.

This then, as we have seen it, is the book of original entries kept by the corporation. But what becomes of the book after these entries are made? It is transferred from the hands of the meter-taker, to the clerk of the corporation, Mr. *Joseph G. Stearns*, and he, too, tells you what his custom is with regard to it. He takes the registry book, transfers its entries to the leger, in the course of a few days, and then deposits this invaluable, original entry book in the iron safe of the corporation, to be kept for three months. But does he know any thing more about the defendant's having burnt gas, than what he has got from the entry in this book? Nothing at all. Not a thing, gentlemen, but what he has taken from this little book. But the big book which he produces, is larger, more formidable, more venerable, and a little more respectable evidence — only for this very reason. And this is the end of Mr. *Stearns's* testimony — except in

so far as he states that his entries are made on the day they purport to be, which, in this case, was the 1st of January, 1848, upon his leger, while the register has it not marked until the 5th of January, four entire days afterwards.

Then comes Mr. *Charles Brintnall*, the cashier of the Company, who brings in the cash book to prove that some previous bills for gas charged to Mr. Gault were paid. That does appear from his testimony, but he does not know that the defendant paid the bills, or who paid them. Next, *Henry Davis*, a collector for the corporation, states that he left a bill for the amount in suit at the defendant's place of business, and called for it once or twice without collecting the money. He reported this fact, but does not know whether or not a letter was written to the defendant, or, if one was written, what there was in it. He never saw or conversed with the defendant on the subject of this bill.

Thus, gentlemen, endeth the first chapter in the plaintiff's case, containing short lessons in the custom of Messrs. *Slader* and *Stearns*, *Brintnall* and *Davis* — the measure-taker, the clerk-transcriber, the cash-charger, and the bill-presenter of this redoubtable, this light and heat-giving corporation. Yet let me say that it is due to them to state that they doubtless are all honorable men. And should it be, that some of them have appeared to you as rather swift witnesses for the other side, I beg you to attribute that rather to their grateful zeal for the interests of their employers, than to any deficiency of integrity in their hearts.

We have disposed, thus briefly, of four witnesses for the plaintiffs.

Then comes Mr. *Nathaniel W. Turner*, who is in the gas-fitting business. In his occupation as gas-fitter for the Company, he went into a store in Washington Street to fix the burners. He saw the defendant there. Whether he had any orders from Mr. Gault he does not say, but he was told that the burners did not work well, and he fixed them. He testifies that the Company measure all their gas by meters, that he is not personally much acquainted with the measuring machinery, but that the measure is a true one, because all the meters are tested by a proof meter kept in the office. He knows that this particular meter was accurate, also, for he saw it tested by the proof meter — but it was no part of his business to test the machines. Now this evidence is two-fold — as to the defendant, and as to the meters. Does it for a moment show either that the defendant ordered the gas, or that the gas was there burned — that it was the plaintiff's gas, or that it was used in the defendant's store — or that

the defendant directed the alteration in the fixtures to be made? Not in the least. If the defendant ordered it to be done, where is the evidence of any such order? If in writing, where is the paper? If in person, who identifies the defendant as giving it? Is any thing of that kind shown? Oh, no. The defendant is there — but he is merely there, and, for aught that appears to us, he says nothing and does nothing in the matter. And as to the meters, — of what value is the testimony of a man employed merely in putting up gas fixtures, one who confesses that he is not well acquainted with the machinery — as to the accuracy of this instrument as a gas measurer, what is that man's testimony worth? Why, he has seen it tried and tested by a proof meter! What does he know of a proof meter? How can he tell it to be such? And how can he tell whether the test is accurately applied? Gentlemen, this whole evidence is not worth a single gleam of a farthing candle.

But we have next the testimony of *Richard Hodson*, a practical mechanic, a different sort of man from his predecessors on the stand, and one who knows, evidently, more than he has explained. He is the meter-maker for the corporation, and for twelve years he has been nothing else. He has patterns and frames, and he makes one machine precisely like another, and every one is tested before it leaves the shop. He made this meter exhibited to you as coming from the defendant's premises. He knows it and identifies it by certain marks, numbers and hieroglyphics upon it. He has recently tested it, and found it accurate, and it must have been accurate when sent out because it is always the custom — here is custom again — to prove the instruments before they leave the works. But this particular machine appears to have leaked, for there is a piece of solder upon it. And the witness says that it would not be well for a meter to leak for a long time, and that if the screw should leak, the gas would escape, and there would be more gas that passed than marked on the register. He is of opinion, however, that if a meter is correct when sent out, and correct when brought back, it must have continued accurate in the mean time. And this meter he proved, both times, by the Edinburgh standard. Undoubtedly he did prove it both times by what he calls proof, and possibly the best proof he could get hold of. But what evidence is there that his proof meter, the Edinburgh instrument, was itself accurate? Where is the evidence that the Edinburgh meter is any better standard than this Company's own meters — or even that it is an Edinburgh meter at all? How does the witness

know that fact? Only from certain marks and names upon it. This is not proof, but supposing even that it were, there is yet a more important point still. Mr. *Hodson* tells us that taking a meter at two different times, and finding it accurate at each, he thinks it must be correct meanwhile. Now how old is this meter, and how long has it been out of our hands? We do not know as to the first question, but it was taken from our cellar two or three weeks before it was brought here, and it is in evidence that it has been soldered, as if to stop a leak. Who put on that solder — who repaired the instrument — who made it suitable for *Hodson* to prove the second time? When, and where, and by whom was all this done? Nobody has stated — we none of us, except my learned brother perhaps, know. And here, I submit, is a fatal deficiency of evidence — a sad breach and chasm in the plaintiff's chain of testimony. Upon this point, they must satisfy you that the machine has not been tampered with since it went out of our establishment, if it was ever there, and this they have not done, nor even attempted to do. And again, it seems to me that even if the erasures and alterations of the register book are not sufficient to exclude it as evidence, yet that this meter can have no authority with you. It seems to me that this lead, and solder, and resin upon it, should damn it in your eyes when the plaintiff attempts to set it up as now and always a perfect truth-teller. What was all this tampering, soldering and fixing up for, if the meter was correct? The witness does not explain, but says that the instrument having proved accurate at two periods, therefore it must have been so during the intervening time. What is the opinion of a man who would say that, worth?

Mr. *Lawler* is the next witness, and he has been for twenty years in the employ of the Company. Eighteen years in the fitting department, and for the past eighteen months as superintendent of the manufacture of the gas. He tells us too, that no meter leaves the shop till it has been proved to be accurate. But how does he know? His business is in another department. But here is only another part of these gentlemen's custom. Mr. *Lawler* knows that it is the custom to make the meters accurate, and therefore he knows that none are ever sent out unless they are so. They are proved by the Edinburgh meter, but how does he know that meter to be itself correct? He has no means of obtaining that knowledge, and there is no such knowledge in evidence from any body. The instrument is not properly attested from abroad by the proper authority, and in the prescribed form. To show the attention which the Legislature has paid to

this subject, I quote from the Statutes of the Commonwealth, as follows: —

"The brass and copper weights and measures, heretofore sent from England, with a certificate from the exchequer, that they were approved Winchester measures, according to the standard in the said exchequer, and which have been adopted, used and allowed in this State, shall remain the authorized public standards, by which all weights and measures shall be tried, proved, and sealed, in the manner provided in this chapter." — *Rev. Stat., Ch.* 30, *Sec.* 1.

We have here no such certificate, and the plaintiff has no right to ask us to assume his Edinburgh meter as a true standard.

Thus, gentlemen, we have got through the case which the plaintiff has sought to build up. We have seen first his little book of registry, then his larger and more formidable book of transcription, and lastly his meter. We have got through them. Now let us recur to the points of defence.

We say in the first place, that we are not bound to say one word unless the case of the plaintiff is made out. It belongs to him to prove all his averments, and if he fails so to do, your verdict must be for the defence. Has he made out his case? I do not believe you think so.

We say that these gas meters are not known to our laws as tests of measure, but on the contrary that there is a penalty for their use which amounts to a prohibition. By the Revised Statutes it is provided that,

"If any person shall sell or expose to sale any goods, wares or merchandise, fruit, grain or other commodity whatsoever, by any beams, weights or measures, that have not been sealed, as provided in this chapter, he shall for each offence forfeit for the use of the town a sum not exceeding ten dollars." — *Rev. Stat., Ch.* 30, *Sec.* 24.

But his Honor has overruled this objection which I took early in the case, and has admitted them for the purposes of this trial.

We say next, that even if the meters were sealed and legal measures, they are not therefore necessarily true. On the contrary, that it is impossible they should be true. They possess inaccuracies, whose degree depends upon their age, their use, and their position. Some of them in this city, it is testified, have been in use more than twelve years, and any machinery during such a period must get out of order. The register of the meter must be liable to some aberrations, so that it will not indicate a correct amount of gas used. And much depends on the care and faithfulness with which they are used. It is obvious that they may be tampered with, that the index may show revolutions of the drum which never were made, and mark the passage of gas that never was consumed. As to position, it is well maintained by the testimony on both sides, that variations in position will affect the performance of the instrument. I care not on which side the error lies or which it favors. The question here is whether the meter is a true measure or not. That is

the point — not whether its irregularities and errors operate to the benefit of the seller or the buyer. And all the testimony concurs that if the meter varies from a horizontal line, gas may escape that will not be registered. And the same if it varies from a vertical line. In other words, the amount will not be accurately registered. In either of those four positions there shall be a variation between the quantity consumed and the amount indicated on the register. All the evidence is that the meters are proved on a level, and I may therefore take it as a conceded point that it is requisite, for a meter to be accurate, that it should be on a level. Now Mr. *Byrnes* states that he found several meters which he tried, to vary from one-sixteenth to three-eighths of an inch from a level, and that one at the Museum was half an inch out of the way. Yet it is in evidence that the Company are still going on to charge their gas and collect their dues by these very same meters, though knowing to the fact that they are inaccurate.

There is another point. We say that this Company charge differently for the same amount of gas, used at different points. You recollect the evidence we have introduced to prove this. Mr. *Aborn* uses twelve burners, and on Saturday nights fourteen, for from two and a half to five hours. His bill for this same quarter was $43.40. Mr. *Cook* has fifteen burners and burns till 10 o'clock on Saturdays. His bill was $46.90. Mr. *Burbank* uses four burners four and a half hours, and his bill for this quarter was $25.55. But for the April and July quarter of the same year, when he used the same burners two and a half hours, it was $4.20. Mr. *Gove* uses nine burners, one of them all day and the others from dark to 8 o'clock, except on Saturdays, and then till 10, and his bill was $15.40. Mr. *Kimball*, of the Museum, in 1841 and 1842, used one hundred burners, except for a part of the time when he had the Indians. His weekly bills varied. He has produced some of them for $21, $24, $29, &c., &c. Mr. *Carruth* uses four burners from 5 to 9 o'clock, and on Saturdays till 10. He has two stores, and his aggregate bills for this quarter were $13.30. In the July quarter of 1846, he is charged for 7200 feet $28.80, but in the corresponding quarter of 1845, only for 1600 feet, $6.40. In '45 he had from four to six burners, and in '46 he had five. In the first case he used the common argand burner, and in the other the batswing; but that is the only difference in his fixtures for those two quarters. You see a much greater difference in the bills.

Mr. *Weeks*, of the Reading Room, uses sixteen burners,

say from 4½ to 9 o'clock in the winter. His bill for this quarter was $70 — but for the next, from January to April, it was $52.25. He burned the same number of hours in both cases, but attributes a part of the difference to greater care and a more economical consumption of the gas. All these are round burners. Mr. *George Johnson* uses one burner every evening, perhaps till 9 o'clock, and three on Saturdays till half-past 10. His bills vary from $7 to $13. Mr. *Bradshaw* has used six and seven burners. In the October quarter of 1843 he had six, and was charged for 7800 feet of gas, $39. While in the corresponding quarter of 1841, when he had seven burners, and used them an hour longer each night, his bill was for 7200 feet, $36.50. And Mr. *Byrnes*, from November 20th last up to January, used seven burners at least six hours, and was charged for 4200 feet, $14.70. In January he used six for seven and a half hours, and was charged for 3400 feet, $11.90. In March, he used about five and a half burners for from five to six hours, and paid for 4800 feet, $16.80. And in May he used six burners, for five and a half hours, while his bill was for 6400 feet, $22.40. Contrast the December bill with that for May, when he had fewer burners, and used them for a less time.

I believe, gentlemen, that this concludes the evidence as to the variation in prices. And I submit to you if it does not conclusively prove that the Corporation has no rule in making its charges but mere guess-work. Not that the Company is not desirous of finding some fixed and accurate method, but they have not found it, and have not got it. And we say, moreover, that this evidence and these bills, compared with the one now in suit, prove that we have been charged, for our gas, more than other people for the same quantity.

Now, allow me to recall your attention to the testimony of the defendant's boy, *Otis Foster*. I will very briefly recapitulate some parts of it.

Foster states that he has been in Gault's employ for two years, and that he paid the gas bill for the last quarter of 1846. The cashier of the Gas Company has testified that he does not recollect that any objection was made to that bill, but Foster swears that he told the cashier that he was sent by Mr. Gault to pay it, but at the same time to say that it was too much for the gas. He did tell him it was too high, but that rather than have any difficulty Mr. Gault would pay the charge. And here, gentlemen, we say that though a young man, inexperienced in law or the form of giving legal notice, the witness did all that Mr. Gault wanted him to do, all that was necessary by way of protest against the

amount of that bill. He made an express statement that he was paying too much. And we claim that they have no right to urge that because we paid that bill as they charged it to us, we must now pay this. We paid it under a compulsory process. Not a legal process, it is true, but rather than to have a controversy at law. And what is his testimony in regard to the bill now in dispute — testimony which I hold to be of as much importance as any, scientific or otherwise, which has been put into the case. He says that during the last quarter of 1847, they used on an average from three to four burners — never over four — and from about half after four to half after eight o'clock. He was always in the store when it was lighted up and when it was closed. It was his business, and no one ever went into the store after he had shut up. The fourth burner was lighted only for the purpose of cutting, and was used probably from a half to two thirds of the time of an evening — so that in fact the average use was of only three and a half burners. The flame was generally about half the height of the chimney — not so high as in the year before — and there was less cutting to do this year than the last. But in this quarter of 1846, they used six burners from the ordinary lighting time till nine or ten, and sometimes eleven o'clock — and in 1847 only four burners for a much less time. Yet they are charged $25.55 for this, and only $26.80 for the other quarter. You remember, gentlemen, the strict and studious cross-examination on all these points, and how completely the witness sustained himself. And I ask you if these facts do not show an egregious and unaccountable departure from truth, and conclusively establish the inaccurcy of the meter. But they attempted to disprove this evidence, and for that purpose brought Mr. *Turner* on the stand. I then offered another witness to corroborate *Foster*, and you recollect the discussion that took place between my learned brother and myself on this point. Enough now that I was not allowed so to do by the Court.

Well, Mr. *Turner* came forward to contradict our witness, and he has either wilfully stated what he knew to be false — and I would not willingly entertain any such idea — or he has testified mistakenly what he did not actually know to be true. He says he went to the store to remove the gas fixtures, and testifies to the conversation that took place. He went there about the middle of November, and my client had moved in about the middle of September.

Mr. Whiting interrupted. The witness stated that he went there about three months after Gault moved in.

Mr. Chase went on. Three months was it? Well, it is immaterial in one sense whether it was one month or three — but yet it is material here in another view, for it contradicts your witness out of his own mouth. His statements vary. He certainly did say "about the middle of September," as the counsel will find on referring to his minutes, and yet he wants to get a statement into my client's mouth admitting that he had been there three months. Well, what next? My client's business is that of a merchant tailor, whose custom it is to keep light articles, fancy goods, besides the cloths from which he makes up his garments. Now it is perfectly obvious, gentleman, to you and everybody else, from every day experience, that people in this business must of necessity keep lights in their windows to show off their goods. But according to *Turner*, Mr. Gault did not have lights during that quarter in his windows. He saw none ever, though he usually saw them in the back part of the shop, and my client told him he could not use his window lights. There never was a more shameless, unfounded, ridiculous assumption than this. Why, gentlemen, look at it an instant. Whatever may be your business, if you find that your gas lights won't burn, what do you do? Is it not to go directly to the Gas Company and tell them to come immediately and fix your apparatus? Do they say they are very busy to-day, and can't come till to-morrow? Your reply at once is, — "Then come to-morrow!" Would any of you wait for three months? By no means. How absurd then to suppose that any one in my client's business would wait for any such time.

Again, *Turner* is confident that Hooper & Co. put in these gas fixtures. How does he know? Why — he heard a man say so! This, too, after having before been cautioned as to mere hearsay statements. Does such a witness, gentlemen, show a proper respect to the law — a decent regard for the truth — a just appreciation of his oath? Not at all. He comes upon the stand swift for the plaintiff, and determined to go through, without knowledge, without memory, and depending only on his imagination. This, then, is the great contradiction of our evidence.

One moment more, gentlemen. It is admitted by the learned counsel for the plaintiffs, that the gasometer is not an accurate measure. It was so laid down in his opening — but that it is the most accurate measure of gas yet discovere. Then he started with this proposition; — that though we may not have had as much gas as is charged, by a strictly accurate measurement, still we had some. Our meter

made a number of revolutions which were indicated on the register, and the figures of the index were taken off. Therefore we ought to pay. But you see, and he sees the difficulty at the very outset. We ask him to tell us how much we have had — not by guess-work, but with accuracy. The Company cannot do it — and they don't pretend to.

Another thing. According to Mr. *Hibbard's* testimony, the radiation, illumination, or light, depends upon the density of the substance burned. And Mr. *Blake* says the revolutions of the meter machine will indicate the escape of one foot of dense gas in no other or different manner than the escape of the same quantity of rare. The wheel will revolve no further nor faster in the one case than in the other. But if light depends upon density, then density is what we bargain for when we buy light — and, according to the plaintiff's own scientific evidence, the meter measurement is utterly irrespective of the density of the gas that passes. I burn ten cubic feet of the rarest gas to-night, and the index shows that I have burnt ten feet. But to-morrow I burn another ten feet, and the index shows no more, and yet I have used the gas perhaps three times as long as before, because it is more dense. This evidence as to the illuminating power of gas depending upon its density, is the opinion of a scientific gentleman — as every body who listened to Mr. *Hibbard* must be well convinced — and one whose perfect competency and intelligence are combined with a modesty which entitles them still more to respect. It is confirmed, too, by Mr. *Blake*. And I might almost rest the case here — upon this single point, that, in order accurately to get at the value of gas, it is necessary to weigh as well as measure it. This, they say, cannot be done. Mr. *Blake* says that gas is weighed in small quantities, but that it is not practicable to weigh large amounts on account of the great size of the vacuum requisite. The reasoning is good so far as it goes — but it is not for Mr. *Blake*, or any other individual, to absorb all the intelligence or inventive power of the age; to say that a thing cannot be done, or that a machine cannot be constructed, by which it may be done. If an instrument can be made to weigh one foot of gas, why not to weigh one hundred? And if one hundred, why not a thousand? And, in this age of human improvement and scientific progress, where are we to stop?

But, gentlemen, let me say that I do understand other gas measures than these meters to be used elsewhere. I am informed that measures of weight — the only true test of the density, illuminating power, and value of gas — are used in

England at this day. You need not be surprised that such a test should be applied, elsewhere, to the measurement and sale of gas, but should rather wonder that it is not applied every where. Because it is the true test — and the only true test.

Gentlemen, I am profoundly ignorant of machinery. John Randolph, they say, declared he would at any time go a mile out of his way to kick a sheep — and I would at any time go a good deal out of my way to avoid a case that had any thing to do with machinery or mechanical details. I shall say nothing to you about the construction or details of these meters, neither shall I enter into any dissertation on the properties of oxygen, or hydrogen, or their compounds. All that, I leave to my very learned and scientific brother who will follow me. But this I will say, that just as an old clock, though constructed upon the most scientific principles, may vary from the sun's course two hours out of the twenty-four — so these machines may vary three thousand feet, in every ten thousand of actual gas consumption, and yet the scientific evidence shall be that their construction is all right.

The witnesses whom the plaintiffs have put upon the stand, are all paid men of the corporation, except Mr. *Blake*, and he is the nephew of my very worthy and good friend, the Agent of the Corporation. Is it asked what interest has he in this business? What interest has he not, except perhaps an immediate pecuniary one? Has he not been here day after day, all the time of this trial, and even before it was ready to come on? He has — you know it. I saw him eager to get upon the stand and give his testimony for a Company which has long employed him, though he has quitted their service now. I accuse him of no improper motive, and take his testimony with every possible allowance for him. But it is clear that he does take much interest in the result of this case. All his conduct shows it.

I have said it was necessary for the plaintiff to satisfy you on each and all the points he set up. Has he done so? Let me ask you for a moment seriously to recall some of his most important testimony, and particularly a portion of that given by Mr. *Turner*, as to the use of gas by the defendant. Has *Turner* said it was the plaintiff's gas — has he identified it? Not at all. But suppose he had — then look to this meter which they have placed before you. What trace is there of that meter's connection with the gas fixtures in my client's store? Not any. Mr. *Slader* says this meter was taken away from our cellar — another witness, that it was from the cellar of the adjoining store. — *Turner* never saw it

there at all. He never saw it. They may bring in a meter as often as they choose, and say it is a true one — but they have offered no proof whatever of the enjoyment by us of that meter. There is no evidence about it, but that of Mr. *Byrnes*, who found a shelf on which a meter had stood, but he never traced any connection of any meter to us. It is the part of the plaintiffs to show such connection between this meter they have produced in Court, and the burners which the defendant used — and if there is the least doubt of that, then we say, the defendant is not bound to pay.

Gentlemen, the case for the defence is about closed. The plaintiff comes into Court to recover payment of this gas bill, and he seeks to establish his claim by a certain course of proof. He brings in first, a small book — the register-book — containing an account of the state of the meter, and then attempts to confirm this by a large book — the leger — which is a mere transcript of the figures in the other, made by another person. He then puts in the testimony of the bill-collector and others, to the fact that defendant had paid gas bills before — and goes on to introduce a multitude of witnesses as to the construction, operation and accuracy of his instruments. It is quite unnecessary to refer to them further.

What has the defendant done? He has asked you to be satisfied, under the instructions of the Court:—

1st. That the plaintiffs have proved their case.

2d. That the measures they use are legal measures. But the Court has set aside this inquiry at this stage of the case, and for the purpose of having a trial.

3d. That their meters are accurate measures of the gas consumed — which, we say cannot be, because there is an inherent inaccuracy in all tests which are not tests of density, the only true criterion of value.

4th. That they do not, as a custom — as we say they do — charge more or less at one place, than another, for the same quantity of gas.

If, on any one of these points, you are not clearly and entirely satisfied, then I boldly ask you to render a verdict in favor of my client.

One word more, gentlemen, and I shall have done. The defence has put on the boy *Foster*, the defendant's apprentice, who has testified that Mr. Gault did burn a certain amount of gas, and the learned counsel seemed to seize upon this as conclusive in his favor. Unquestionably he did burn some. But no man brought to trial on an account is bound to pay what is not proved against him. If the mat-

ter is kept out of Court, and settled on any terms whatever, it is nobody's business but that of the parties themselves. But here we have been dragged into Court, and before a jury, neck and heels — and we stand on our rights. Let the plaintiff prove that we had his gas for this quarter, and how much we had of it — let him show that we had one farthing's worth from him, or abandon his claim to that one farthing from us. At all events, gentlemen, he must clearly prove the fact which he asserts, before you will give him the verdict which he seeks.

Mr. Chase having finished his argument for the defence,

Mr. Whiting proceeded to close for the plaintiffs, as follows:—

May it please your honor, and you, gentlemen of the jury.

You have learned, gentlemen, from my colleague, who opened this protracted trial, that the claim for which this suit is brought, is the sum of $25.55 — the price of 7,300 cubic feet of gas, which, we say, was supplied by the plaintiffs, to the defendant, during the three months preceding the first day of January, 1848. In order to maintain our case, it is necessary for us to prove two propositions:— first, that the plaintiffs have a right to sue; and, second, that they did supply gas to the defendant, which he used during the time above-mentioned.

1st. As to the right to sue. The plaintiffs come into Court as a Corporation, not as individuals, and it is necessary for us to satisfy you that they have the right to bring this action. To this end, we have produced their act of incorporation by the Legislature, and evidence that the Corporation has been duly organized. But, in order to save time, our right has been admitted, and is not, therefore, to be considered here.

2d. We must also prove that during this quarter of a year — from October, 1847, to January, 1848, the plaintiffs did supply some gas to the defendant. On this point — not being aware what course the counsel for the defence would take — we intended to call attention to the charges on the Company's books; the registers of their meters in general, and of this one in particular; the fact that the defendant has paid previous bills according to the register of this same meter by which he now is charged; and to various other circumstances which, no doubt, you recollect. But all argument as to this is now rendered unnecessary by the testimony of Gault's own witness — *Otis Foster*, by whom the

fact is proved that he did burn gas during this period. He therefore is estopped from denying it, because he cannot discredit his own witness. There is now no room for controversy on that point.

Mr. CHASE here interrupted, and said that *Foster's* testimony was, that four gas burners only were used — not that the plantiffs furnished the gas consumed.

Mr. WHITING resumed. Well, sir, this statement, in connection with the facts — that those four burners communicated with our service-pipes, mains and gasometer; that Gault paid bills to us before for gas; that he complained to the plaintiffs that the gas he had of us "did not work right," and wanted to know "why he could not be attended to as well as others" — is quite enough. Gentlemen, I will not waste your time in arguing this point. When my opponent shall have satisfied you that there was any other Gas Company in Boston, except the plaintiff's, which could have supplied the gas used by his client — it will then be soon enough to look further into this question.

There is, however, another point which it is necessary for us to prove; viz:— that the price charged to the defendant, is a fair and reasonable price for the gas supplied. It has been put in evidence that, formerly, five mills per cubic foot was the price at which the plaintiffs furnished their gas; that the charge was subsequently reduced to four mills, and afterwards to three and a half mills per foot. The books of the Company, and the bill against the defendant, which you have before you, show the charge for this quarter to be three and a half mills — and we have proved that Mr. Gault has paid previous bills at the same rate. This course of dealing between the parties is conclusive against the defendant, unless he can show that for this last quarter of 1847, he made a new bargain with us. Is there room for any such pretence? Has the defendant attempted to put in an atom of testimony to that effect?

But another, and the last, question relates to the quantity of gas supplied. In other words, it is whether the quantity charged to Mr. Gault in this bill, is substantially the quantity actually furnished to him during this quarter. If he had more than he is charged with, he cannot complain. If he had less we do not ask a verdict at your hands.

It is true that we come into Court, and before the Jury, as a Corporation — but we are none the less the representatives of several honest and respectable gentlemen, some of whom, doubtless, are personally known to you — and they

are not only willing, but anxious, to do what is right. We do neither expect you, gentlemen, to entertain a prejudice against us because we are an association for the purpose of manufacturing gas, nor a prejudice against the defendant, because he is a tailor. We ask what is just, and nothing more.

Now, although the amount in dispute is but the paltry sum of $25.55, you cannot but be aware that the event of this suit is of very great consequence to the plaintiffs, while it can be of comparatively little to the defendant. It can be a matter of no moment to Mr. Gault whether he shall pay $23, $24, or $25, for this quarter's bill. But it is of the utmost importance to us that — after a full and elaborate hearing of the case, and a thorough display of all our machinery and processes of measurement — you, gentlemen, and through you, the community, shall be satisfied that in our dealings we act like honest men, and not like rogues.

The legal costs of the trial, too, are comparatively trifling. We have introduced only seven witnesses, and the defendant, I believe, has called something less than twice that number. But the other expenses to us have been considerable, as you must have supposed — amounting to at least a thousand dollars. We have gone to this cost, not to collect a petty bill of twenty-five dollars, but to enable the Jury, our customers who use our gas, and the citizens at large, clearly and fully to understand the system of our business — to see how we measure our gas, and how we make our charges: and for the further purpose of answering — nay, of annihilating — those charges which the counsel for the defence has been instructed to bring against us. Every body must see that it would be better economy in us to suffer the loss of a disputed bill, and to protect ourselves for the future by shutting off the delinquent's gas, than to incur this disproportionate expense in its collection. But we have long wished to test the question of our ability to collect our bills by law, and we must beg your indulgence, therefore, while we attempt to lay before you — to the best of our poor ability — that which we wish to be known to every body.

We have stated that the last inquiry in this case relates to the quantity of gas supplied to the defendant, according to the charge in this bill. And as to this point, we maintain two propositions:—

1st. *That the number of cubic feet registered by the meter is substantially, and for all practical purposes, correct.*

2d. *That, under the circumstances of this case, the defendant is legally bound to pay for the quantity registered, whether it be, or be not, the exact number of cubic feet used by him.*

Or, to state them in different terms, we say:—

1*st*. *That the number of cubic feet of gas charged to Gault, is the quantity used by him.*

2*d*. *That whether the number of cubic feet charged for, be more or less than the exact quantity used by him, he is bound to pay that charge, provided it be for the quantity registered by the meter.*

Now, as to the first proposition — that the number of feet is correctly charged, or that the plaintiff's charge is a true one.

This branch of the inquiry involves the consideration of the mode of keeping the Company's books of accounts. We have shown to you the three books — on which the records of the meters are taken — their charges made — and their cash entered. First, the *meter register book;*—second, the *journal* or *leger;* and third, the *cash book.* They will all be placed before you, and, if you choose to do so, you can examine the state of every gas consumer's account for a dozen years, and for every quarter of each year. You have it in proof, too, that the clerk of the Corporation is sworn, under the provisions of the Statutes of the Commonwealth, to make true entries, and keep true records. He does not stand in the situation of a merchant's clerk — to whose honor alone his employer trusts — but is placed under the solemn sanction of an oath, that he will make all his entries truly. He has been produced here, again under oath, taken on the stand, and he tells you that he has performed his duty. And permit us to remark, in passing, that of all the witnesses we have produced, not a single man of them is interested in the Corporation to the amount of one cent. It is charged, and with regard to some of them truly charged, that they are the *hired servants*, the *paid agents* of the Company; — but so is my brother Chase the hired agent of his client, and I trust he will be liberally paid. Certainly if untiring zeal ever can deserve ample remuneration, my indefatigable opponent is fully entitled to it here. So are we the agents of our clients, and we hope to be generously paid. We suspect too, gentlemen, that but few of yourselves have reached the present hour without having been, at some period, paid for your services. And it is a strange charge to bring against any man, that he cannot, or will not, tell the truth about his employer's business, because that employer pays him for his labor. Yes, gentlemen, some of our witnesses are the paid servants and agents of the Boston Gas Light Company — but we will venture to assure you that if any one of them should tell a single falsehood, he would be so no longer. It is not necessary to say more on this topic.

Let us now examine the modes of measuring gas, and making eharges for the quantities used.

In the first place, the persons whose duty it is to make records of the state of the meter-registers — the meter men, as we will eall them — periodieally visit all the meters in the city. Each man carries a book prepared by the elerk, with its folio, eonsisting of two pages, ruled from top to bottom, so as to leave spaees for entering a number of eolumns of figures. The first, or left hand, eolumn eontains the name of the street, and the number on the street, of eaeh store where the meters are stationed. The seeond eolumn is left blank, to be filled up in peneil, by the meter-man, with the name of the oeeupant of the premises for the time being. These pencil marks, it is true, are original entries, but not entries of eharges. They are memoranda from whieh to make original entries, in the journal, and are, in fact, preeisely like the memoranda whieh are often made in our pocket-books, as we are engaged in our daily business, to be afterwards transcribed into our original entry books. They are of the same nature as the aeeounts we keep of our travelling expenses, to be entered on the eash-book when we return home. The names of the streets and the numbers of the stores are put down in ink, and are not ehangeable; but the names of the oeeupants of the stores may ehange, as frequently they do. And when they ehange, the meter-man must either throw aside the meter-book, or insert the name of the last oeeupant. Another column eontains an entry of the number of the partieular meter in each store — and it so happens that, in this book before you, there is the original entry of the number of the meter in Gault's store. So that it is identified in two ways; — by the entry in the meter-book, and by the testimony of a witness.

The right hand page of each folio of the register-book is ruled into twelve eolumns, wherein the figures indieated by the hands on the index of the meter, are eopied and entered at eaeh suceessive quarter. From this book, they are entered upon the journal of the Corporation, and never ehanged. The oeeupant of a store may change a thousand times — the reeord of the state of the meter in that store, at any one moment, never. You will find the figures of the indexes recorded for every quarter for fifteen years past. The meter-book belongs to the elerk, and just before the end of eaeh quarter, it is plaeed in the hands of the meter-man, who eommenees his round, takes his registers, enters them, and as soon as that is done, returns the book to the clerk, who then eopies the entries into the journal. Thus there can be no chance

of perversion or alteration. No one connected with the Corporation, except the clerk, knows the state of the various meters — Mr. *Darracott* himself does not, unless he examines the record — and there is no possibility of any tampering with the accounts. The only tampering I can conceive of is with the meter itself, and of that I shall presently have occasion to speak.

But I should have noticed one other fact. The meter-man has told you that after he has made each pencil entry, in order to prevent the possibility of mistake — (and we know of course that every human being is liable to mistake at times) — he examines a second time the register, or index, of the meter, and if there is the slightest inaccuracy in his entry, he at once corrects it on the spot. And certainly there is no man of common intelligence, no man who can even read figures, but can tell, in twice looking at an index so plain as this, whether his transcript of that index be true or not.

Then, gentlemen, the journal, or leger, can consist of nothing more or less than a sworn record of the figures of the indexes of the meters from the meter-book. The amount of gas consumed in any one quarter, is found by deducting from the amount registered at the end of that quarter the amount registered at the end of the quarter preceding. Thus, for instance, if the difference between the quantity registered at the end of the last quarter of one year, and the quantity registered at the end of the first quarter of the succeeding year be represented on the index by the numeral figures 1, 9, 0 — the amount of gas consumed in that first quarter will be 1900 feet. You may examine and test ten thousand different instances, and still you will not detect a single error. The books enable you to try the experiment.

The cash-book, like all cash-books, contains merely entries of payments and receipts.

Gentlemen, we undertake to say that there cannot be found a set of books kept with more accuracy and beauty than these. We are proud of them. We rejoice in having an opportunity to show them to twelve intelligent men. And besides, this is almost the only system of books, in regard to the consumption of gas, in which *all errors correct themselves*. I am aware, of course, of the beauty of the Italian system of book-keeping by double entry as applied to mercantile business, but the Jury will readily perceive the inconvenience of applying that method to a business like this. But in our simple and beautiful system, if any error is made in one entry it must correct itself in the next, if the meter continues to revolve. If not, all the loss is the Company's,

and not the consumer's. Thus, suppose in the first quarter of 1848, from January to April, that the meter-man has made an error in copying the index, and you pay for more gas than you have actually used. In the next quarter, from April to July, you will pay for just as much less than your real consumption as you were overcharged before. Because all you pay for, this quarter, is the difference between the number of feet of gas recorded by the index for the last quarter, and the number recorded at the end of this. To make it plainer, if possible, suppose that in two consecutive quarters you have burned equal amounts of gas — say fifty feet in each, one hundred of course in both. But suppose, from the meter-man's mistake in copying the register, he puts down in his book the figure 6 instead of 5, as shown on the dial, and you are thus charged for sixty feet instead of fifty, for the first quarter. At the end of the next the register indicates the aggregate consumption of one hundred feet in both, and you are charged for the difference between that and sixty feet — or forty feet — which is ten feet less than you have used, as sixty feet was ten feet more than you burned in the first quarter. Some of these meters may continue their revolutions for a life-time without requiring to have the index changed. Those which have five dials, for example, will register the consumption of 100,000 cubic feet of gas for each revolution of the hand upon the fifth dial. And there are those in this city whose meters have continued their uninterrupted registration for fifteen years.

Thus you see, gentlemen, how all possible errors of the meter-man correct themselves, if the party charged continues to consume gas — and we believe you will fully justify us in the compliment we have paid to the books of this Corporation.

One more fact it is of importance to bear in mind. These meters or gas-measurers, are at all times in the possession and within the control of the consumer, and not of that of the Company; so that if there be any power to defraud, it is the power of defrauding the Company, and not the consumer. The Company trust to the honor of their customers — not the customers to the honor of the Corporation. It is true that the plaintiffs may send their men to visit the meters whenever they please, but not all their force could examine twenty-five hundred of these instruments in any one day, nor can any one meter, from the nature of things, be kept under constant supervision. But the index being constantly in the possession of the consumer, *there is not a moment when he may not see how much his register indicates, simply by raising the slide in*

front of the dial; and every time when the meter-man comes to take the state of the instrument, he may look over him, if he pleases, and *satisfy himself, at the instant, that a true entry is made.* There is no conceivable way in which he could be better guarded against imposition or mistake.

But there is one souree of mistake, or misfortune, to the Corporation. *When the index of the meter ceases to move, no gas at all is registered.* In this ease we are obliged to leave it to the honor of the eonsumer to pay for whatever quantity he thinks he has burned. It is the eustom in sueh instanees, to make out the bills for a quarter in whieh the index of the register has not moved, for an estimated average of the usual eonsumption, or aeeording to the amount eonsumed in eorresponding quarters of previous years. These are ealled "estimated bills," and in every ease the word "*estimate*" is written on the bill before it is sent out, and the eolleetor is instructed to tell the eonsumer that if he is not satisfied with the eharge, he may pay whatever he thinks right. It is left to his honor to pay the estimated amount, or to pay for what he thinks he used, or to pay nothing at all — as he pleases. Out of all the witnesses on the stand, Mr. *James T. Johnson* is the only one who ever received sueh a bill — and he produeed it, with the word "*estimate*" upon it. You remember his testimony, gentlemen; — that his meter had stopped — that he had burned gas during that quarter — that his bill was presented by the eolleettor, who told him that he would average it, or compare it with the eorresponding quarter of the year before, or, if he was not eontent with that, he need not pay any thing — and that he agreed to an average. This is the only sueh instanee now in evidence.

Sueh, gentlemen, is our system of making our entries and charges — and a more clear or preeise method we are at a loss to eoneeive of. You see all the books before you, and if you will have the patienee to make a thorough examination into them, and ean find a single flaw, there is not one member of the Corporation who will not be greatly obliged to you if you will point it out. All this having been elearly shown, as we hope, may we not say that it is not too mueh for us to assume that the entries in this partieular case of Gault's, were justly and eorreetly made? Nobody has had any thing to do with them, exeept the meter-man and the clerk, neither of whom has the slightest interest to falsify in favor of the Company, and one of whom is sworn, beforehand, to make true record in every instance. Nor yet has there been any attempt to impugn their accuracy.

Now having proved, as we trust we have, that the 7300 cubic feet is the amount registered on the index of the meter, we come to the very important question as to the accuracy of the measurer, or instrument itself — that is, *whether or not the index truly indicates the number of cubic feet consumed?*

Is the Gas Company's meter a reasonably true measure of the gas which passes through it?

In order to determine this question, you must understand the nature of the article to be measured. The substance which we supply to our customers is not like corn or water, which may be handled, measured and weighed, under the pressure of atmospheric air, and whose weight or measure we can tell by the eye or the scale — but, on the contrary, to weigh and measure our gas we must apply the methods and expedients pointed out by those who are instructed in these matters. And for you, gentlemen, to determine the question now to be considered, you must resort to your own common sense, guided and enlightened by principles of science.

The article of gas which we furnish is not the same as that supplied by the Gas Companies in England, nor, so far as we know, in any other country. It is not the same as that of Philadelphia — and though my brother CHASE has stated it to be similar to that burned in New York, we are under the impression that he is misinformed. We think, on further examination, that he will find our gas to differ considerably from that made by almost, if not quite, all large manufactories now known. Our gas is a very great improvement over the English article, being *a mixture of carburetted and bi-carburetted hydrogen*. Carbon, as you all know, is but perfectly pure charcoal, and hydrogen is a familiar gas — one of the elements of water. Hydrogen itself is combustible, but, when burnt alone, it gives out only a slight, thin flame, somewhat like that of spirits of wine — producing but little light. Now carburetted hydrogen is nothing more than infinitely small particles of carbon, or pure charcoal in the gaseous form, united with infinitely small particles of hydrogen. But bi-carburetted hydrogen is composed of particles of hydrogen united with a greater proportion of carbon. The gas furnished by the Boston Gas Light Company, consists of about fifty-five *per cent.* of carburetted, and forty-five *per cent.* of bi-carburetted hydrogen. Carburetted hydrogen is composed of one measure of hydrogen united with half a measure of carbon, in the form of a gas. Bi-carburetted hydrogen — sometimes called *Olefiant gas* — is composed of equal measures of carbon and hydrogen. Repeat this mea-

sure of carburetted and bi-carburetted hydrogen, in these proportions, until they fill a cubic foot of space, at the average pressure of the atmosphere, and when the thermometer of Fahrenheit stands at sixty degrees, — and you will then have a cubic foot of our gas.

This bi-carburetted hydrogen will, of course, burn. It is lighter than atmospheric air by about one half — though some combinations vary in specific gravity from .444 to .700, or from nearly .4 to .7. The average may be taken at about .55, and that approximates to the specific gravity of the gas we furnish. Thus our gas is rather more than half as heavy as atmospheric air. You see how very subtle a substance this gas is — that it is not like water, or carbonic acid gas, which you may pour from one vessel to another in the open air, as the superior weight of the air would displace the gas in any open vessel.

Now, gentlemen, considering what is the sort of substance we have to deal with, let us see how we are to manage to convey it from one end of Boston to the other, and distribute it to the burners of our customers as they may require.

This gas, like all others, is *compressible* and *elastic*, or *expansive*. You may fill a cylinder with it — say a common syringe, with its lower end closed — and by forcing down the piston you will compress it more and more, according to the power you are able to employ. The same may be done with air — as is seen in the air-match, where the compression of the air in the cylinder creates so much heat as to ignite substances placed on the bottom of the piston. Hydrogen and oxygen, compressed or united, make water; and water may again be resolved into its elementary gases by a voltaic battery. Water itself is susceptible of compression, though but to a very small degree. And the same principle of compressibility, under pressure, holds good with regard to all gases; and when under pressure, of course their density is greater than it would otherwise be.

This gas of ours is made from pit coal, bituminous coal, which is placed in iron cylinders — technically called retorts — and heated to about a cherry-red heat. At that temperature the coal begins to give off gas, composed of carburetted and bi-carburetted hydrogen, combined with carbonic acid gas, sulphuretted hydrogen, and various other matters — in which state it could not well be used for the purpose of illumination. When the retorts have been kept at this heat for about four hours, the gas is very nearly all expelled from the coal — leaving it the substance called *coke*, which is then taken out of the retorts. But as the compound of various

gases and acids that we have obtained cannot be burned, or at best would give but a miserable light, it is necessary to purify it. For this purpose it is forced into purifiers and passed through lime-water, or a solution of potash, or some other alkali, by which process every thing except the carburetted and bi-carburetted hydrogen is separated. It is then passed into the great gasometer, or gas-holder, whence it is forced, by the pressure of a portion of the weight of the gasometer, into the great street pipes, or mains, and in them carried to every part of the city. From the mains it is conducted by service-pipes to the premises of the consumers, carried into the meters, and by fixtures — or the small pipes in the premises — delivered to the burners where it is finally used. Thus the supply is constant at all times of the day and night. But as the Company cannot at one time make more gas than the gasometers will hold, and since, if they should make less there might be danger of an insufficient supply — they are obliged to regulate the amount of supply according to the amount of gas consumed; and this is easily seen by the register at the Gas Works, which shows the amount made, the amount distributed, and the amount on hand at all hours of the day and night.

The gas is injected into the street mains by a pressure nearly uniform, which is accomplished by a most beautiful mechanical contrivance, similar to that exhibited to you in our experiments here.

My able opponent has admitted, what I knew he would not deny, that the practical manufacture of gas was a most valuable result of chemical science. Gentlemen, gas gives us the most beautiful, luxurious, convenient and economical light in the world. It burns with more brilliancy and constancy than any other substance that can be generally used, and is less dangerous, because it is not liable to be carried about. It is produced from coal — a material of which nature has given us an inexhaustible supply, as if with a special view to its continual necessity in the manufacture of this glorious light. The fact that such enormous quantities of gas are used — not only here, and in this country, but throughout the whole civilized world — proves at once not only its value, economy, and beauty, but also shows what an incalculable saving it has effected in human and animal life, by dispensing, in part, with the necessity for common oil — an article obtained only at the greatest risk of life, and at a very heavy expense. And let us for a moment suppose that for a few years past we had had no gas, and yet that the community had required as much light from oil as it has had from

gas during that period? We think that even those of the discontented who grumble loudest at their bills would have found that the mere rise in the cost of oil within those few years, would far exceed the whole amount they have paid for all their gas-light. Nature does not produce whales *ad infinitum*, and exactly *when* they are wanted to supply an increased demand for oil — but gas can be had in any quantity, at any time required. And therefore it is that we say, gentlemen, that, to this and every civilized community, gas is a benefit and a blessing. And every Corporation that makes it is a public benefactor. Every man who cheapens that which every body must use, confers a benefit on the whole mass. The Gas Companies do cheapen that article of prime necessity — LIGHT — and not only so, but they bring it within the means of poor and humble men, who, but for gas, would be deprived of a large portion of the light they now may enjoy.

But in order to have light thus cheap and plenty, several things are necessary. To make gas *cheap*, it must be manufactured *in large quantities.* To make it in large quantities, a great expenditure of capital is requisite at the outset. And to obtain this large capital there must be a combination of several individuals, or a Corporation. No one man, unless his pocket were of true "aldermanic" capacity, would think of risking $300,000 in the experiment of supplying a city with gas. My brother rises to interrupt me. Well, to accommodate him, we will take off $30,000 — and say that no single judicious individual would risk $270,000 in such an experiment. No one would embark in the undertaking unless he had associates *to share in the risk* as well as *to partake of the profits.* No one man would build, at the hazard of all his fortune, a railroad. It must be done by an association, a clubbing together of purses and of minds. That was the way the Western Railroad was built — that was the way the Gas Company was established — that is the way that every heavy manufacture must be undertaken. For unless it be so, individuals cannot manufacture so enormous a quantity of the article they deal in as is necessary to render it cheap.

The nature of this gas is such that, if mixed with atmospheric air in certain proportions, it is infinitely more explosive than either gunpowder or gun-cotton. Its explosive force is irresistible. And therefore its manufacture is attended with *immense risk* — so great that no insurance Company in the world can be prevailed upon to issue a policy on gas-works, and no individual can afford to run the hazard

by himself. Consequently, to obtain this article of absolute necessity at a cheap rate, we must resort to a Corporation. It is a Corporation alone, "monster" though it be, that can give us gas — and however hideous it may appear to my brother CHASE, it bears a very benignant aspect to the poor man whose midnight toil is rendered cheerful by its light.

We wish you now, gentlemen, to imagine for a moment that, by some miracle, *all known modes of measuring gas should be lost.* Suppose the works to be constructed as they now are, but the meters to be destroyed. People must have light, and each man would continue to draw from the pipes as before. But what could the Company do? How would they stand? By what conceivable method could they get a fair remuneration for what they furnished, or tell whether they got it or not? Suppose, again, instead of delivering the gas in each man's store or house, as at present, the Company should require every one to come to the works with his air-tight canister, and carry off his purchase; — or, like the baker and the milk-man, should send round their own servants to leave each customer's supply at his premises. You see at once that where considerable quantities are burned, a great space would be required to hold the daily or nightly supply. A theatre for instance would need a large room to contain the gas used in a single evening. And who is there that does not perceive that the expense and inconvenience of either of these ways would be so great that nobody would use the gas at all. This is not matter merely of argument or conjecture. The experiment was tried in England, where a Company undertook to send round the gas, greatly condensed or compressed in bulk. But they speedily abandoned the attempt, and with good reason. Why, gentlemen, consider the immense danger. You shall have your daily supply of gas compressed into a gallon measure and placed in your cellar till you need it for use. By the carelessness of your servants, by fire, or by one of the thousand accidents that are continually occurring, it explodes — and, to use a phrase of the street, you are blown into the middle of next week. And this would be liable to happen at any moment.

The next expedient is to let the party interested inform the Company how much he has burned, and pay for that quantity. That might do very well in certain cases. Honest men will not cheat the Company, and they may be trusted. But possibly there may be some among the consumers of gas who are not honest men — and in that case the Company would suffer greatly. It is possible, we will say,

that a tailor, or any body else, may shut up his shop, close his windows, send his clerks and boys home at eight o'clock, and then — on account of a quarrel with, or a grudge against the Gas Company, or for his own convenience — keep his lights burning all night. And at whose expense? Do you suppose he would permit it to be at his own, if the Company had no means of proving the amount consumed or wasted? Certainly not.

It is quite certain that any gas-making Company would sink into gradual, but inevitable, ruin, if every man were permitted to use what gas he might want, and to pay for it, much or little, at his pleasure. Most persons wish to have their tax-bills made as small as possible — and many people grumble at the amount of their taxes, though they not only have the privilege, themselves, of furnishing the valuation of their estates to the assessors, but are expressly invited to do so. And although these valuations are made by disinterested persons, and are doubtless, in general, quite correct and equal — yet complaints of their injustice and inequality are almost universal. Does not this fact show that men are generally unjust judges when called on to decide cases involving their own interests? Would not the same difficulty arise if they were called on to adjust their quarterly accounts for gas? Would they not just as much grumble at their bills, as they now do at their taxes? Would not they tell us — as Gault has told us — that they had burned less in this quarter than they did during the last, though charged for the same quantity? And might they not allege the same fact, even though the watchmen on duty should prove to us that their lights were burning till morning, night after night? But we have said enough to show that this system of trusting to men's "say so" is not one in which you, or any rational men, would choose to deal. The trader uses his yard-stick, his scale, or his measure. Business cannot go forward without them. No one would be so insane as to say to a crowd of purchasers — "Gentlemen, there is my cargo — let each take what he desires, and make up his own estimate of what he has taken." If the amount of the purchaser's goods, instead of being determined by measurement, were to be settled by his estimate, or judgment, however honest, who can doubt that mistakes would multiply? And if this be so, in relation to subjects on which men have most experience, and the best opportunities of judging — how much more would they err on subjects like the one before us — the conjectural admeasurement of gas, which, from its nature, precludes all opportunity of the consumer becoming

familiar, by experiment, with its qualities, or with the velocity of its passage through the pipes!

Then it is obvious that we *must necessarily have some measure*, some contrivance to determine the quantity of gas, and one that shall be reasonably accurate. It is not necessary that it shall be incapable of error, but that it shall be substantially accurate and just — to the consumer, and the manufacturer. And such a measure we have — as we shall attempt, I hope not unsuccessfully, to prove. For greater convenience, we will separate the proof on this head into two classes.

1st. *Proof by experiment — actual demonstration to the senses.*

2d. *Proof by philosophical demonstration.*

And, first, by actual experiment. That *you have seen exhibited before you in the adjacent entry.* A distinguished practical engineer and mathematician, has measured the cubical contents of the gasometer which you have seen tried, and has twice gone through with his calculation, to make "assurance doubly sure." He has testified that it contains precisely two cubic feet of space. You witnessed the performance of this gasometer, of the Edinburgh proof meter, and of Mr. Gault's meter. And you saw that, in their measurement of gas, they precisely corresponded with each other. It has been testified by numbers, and denied by nobody, that *every meter is carefully tried at the Company's office before it is permitted to go out.* And how is it tested? Its correctness is demonstrated to the senses in the same way that you saw the correctness of this meter, here, demonstrated the other day. There is stationed at the office of the Corporation, in Washington street, this same most carefully constructed gasometer — which it cost $900 to import from Scotland, and which is as accurate as human hands could make it. A pipe from the street main at any time fills it with gas. The gas is forced, by a slight pressure, from this instrument, and passed into what is called the Edinburgh *proof meter* — an instrument made by one of the most eminent, careful, and correct machinists in the world — one which has been repeatedly tested and never found in the least erroneous — and thence successively delivered into and passed through a row of meters ready to be tested. The same gas is passed through all of them, and, to avoid the possibility of mistake, not one foot only, but *ten feet* are sent through each meter, so that every error is magnified tenfold, and must become apparent to the eye. If any one meter does not exactly conform to the standard, it is taken

off, carried into a different apartment and regulated to the required degree of accuracy by raising or lowering the level of the water-line, upon which, as you have learned, the adjustment of the instrument depends. And now, we say to you, gentlemen, that no measure ever used in this market — no quart, no bushel measure, no pound weight — was ever tested with more pains, more care, more skill, than this Company employ in the trial of every one of their meters. We have shown you the experiment. We passed two feet of atmospheric air, in the first place, through the gasometer, the proof meter, and Gault's meter — and you found them all exact. We then passed two feet of gas through each of these instruments, and you saw that they all measured exactly alike. Every body who witnessed that trial *knows, by the evidence of his senses, that Gault's meter was perfectly accurate.*

Thus we have shown, by actual experiment, ocular demonstration, incontrovertible proof, that the meter before you is correct in all respects. I shall not spend time in attempting to prove that this identical instrument was Gault's meter. There is a number upon it, and that same number is recorded in the Company's books as that of the meter sent to the premises of the defendant. That it was placed in the cellar which extended under an adjacent building is true. But it is identified by the books, and by the man who removed it. And whether it was stationed immediately in the premises of Ross, or of Gault — whether Ross occupied the cellar under Gault's shop or not — is of no consequence at all, provided you know that this was Gault's meter. I will not waste time on that. But, if the learned counsel has succeeded in persuading any one of you to suppose that the plaintiffs would be mean, cowardly, wicked enough to attempt to palm off any other person's meter upon his client as his own, I hope that you will not only give him your verdict, but that you will do your best to annihilate their reputation as honest men.

It appears that, at some time, Gault's meter had leaked, thus lowering the water-line. It follows that Gault has had the benefit of more gas than his meter has registered. The leakage has at some time been stopped by solder; and thus restored to its true action — to that action which has been proved correct. The counsel for the defendant has chosen to call this "*tampering*" with the meter! But our workmen on the stand were asked if they took the meter apart? They said no. It was soldered because it would not hold the right quantity of water, but that soldering could not

make the capacity of the instrument either more or less, nor could it alter the wheel. The only tampering it was possible to effect was the lowering of the water-line, thus enlarging the amount measured by each revolution of the drum, and that we think *somebody did do*, before we took it from the defendant's premises. But we charge nothing of the kind upon the defendant.

Now, gentlemen, we have shown to you the actual performance of this meter, and if any more conclusive demonstration of its correctness can be conceived of, I confess I know not what it is. It is tried in your presence, and you see with your own eyes that it measures just exactly what we say it measures, and neither more nor less. No attempted sophistry, no eloquence of counsel, can undermine your confidence in that plain, simple fact. And, therefore, we say that by this test of actual experiment we have shown that the gas meter is a true measure of gas — that each revolution of its drum, or wheel, indicates the passage of a "measured amount" of gas. It is a true measure of *quantity* — though we do not pretend to assert that it measures in any wise *the density* of the fluid. But of that hereafter.

We come now to the second point of the proof—the philosophical demonstration.

At this stage of the argument the Court adjourned till the next day.

THURSDAY, AUG. 3rd.

The Court and Jury being in their seats, the case was resumed, and—

MR. WHITING continued his address to the Jury.

When the Court adjourned yesterday, gentlemen, I was endeavoring to explain the operation of the meter, and to demonstrate its accuracy as a measure of the quantity of gas that passes through it. You will recollect the point at which we had arrived, that it was established by ocular demonstration, eye-proof, that both the Edinburgh and Gault's meters were in perfect conformity to the gasometer—and furthermore, that the gasometer itself had been proved true by the testimony of a sworn man of science. Mr. *Boyden* measured it here, and has stated to you its exact capacity. You then saw the two cubic feet of air which it contains, passed through the two meters on the platform in the entry, and noted their performance. We shall now proceed to the second branch of the demonstration of the meter's accuracy, which I shall derive *from the construction and operation of*

the machine. I shall endeavor to show, so that all may see, how it is that a cubic foot of gas, in passing through the meter, causes a revolution of the wheel, and how that revolution marks the escape of a cubic foot of gas upon the index of the register. I know it is not an easy matter to clearly explain the simplest machine, and that with regard to one so complicated as this, the difficulty is greatly enhanced. But if I shall succeed in enabling you to understand the principle and operation of these meters, one great object which the Company have in view will have been accomplished. We trust to be able to show you the philosophy of the instrument — to convince you that it is no empirical contrivance, but a machine which works with the same regularity as a clock — to demonstrate that, if it goes at all, it must go truly; and that, if it does not go, the *error of measurement is all in favor of the consumer.* Yesterday I endeavored to explain how the gas was made, and conducted from the great gasometer to the meters. Now it remains to show how it passes into and through the meters, and from them to the small pipes leading to the burners.

[N. B. At this period of the argument, it became wholly impossible for the Reporters to transcribe Mr. Whiting's rapid explanation of the meter, assisted as it was by a skeleton model, which he took to pieces before the Jury. We therefore subsequently applied to him to write out a description of the instrument; and have been furnished with the succeeding statement — much briefer, and less copiously illustrated, than was his explanation to the Jury — but yet sufficient, it is believed, with the aid of the diagrams which will be found in the Appendix, to give a competent idea of the machine. It may be proper to state that, after the counsel had got through that part of his argument which contained his description of the meter, he particularly inquired of the Jury whether they fully understood its nature and operation, and was answered in the affirmative by all of them.

The following is the written description obtained from Mr. Whiting, who also prepared the originals of the drawings, which were afterwards presented in perspective, on wood, by Mr. M. G. Wheelock.]

The object to be accomplished by this instrument, is the measurement of gas, as it is flowing from the service pipes to the burners. There have been various meters constructed. The one we use is as simple as the nature of such an instrument will permit it to be. It is represented complete, in

figure VIII of the Appendix.* The outside case of the meter, as well as the inside drum, is usually made of tin, and the former is painted. The case — that which encloses the whole apparatus — is divided into two compartments or chambers; the *front* compartment is smaller than the other, and is the part projecting in front of the cylindrical chamber; — it is the rectangular, or square-looking, part of the instrument. The front of this chamber being removed, it would present the appearance of the part marked A, B, C. D, in figure I. In ordinary sizes, this chamber will measure about nine or ten inches in height, and seven or eight in width, and projects about two or three inches. It is large enough only to give room for the different parts which will presently be described. The gas is introduced by a pipe — (E, figure I) — into a small portion — (A, figure I) — of the front chamber, which is partitioned off from the rest and has no communication with it, except through a valve — (F. figure I). This valve is connected with a hollow ball — (G, figure I) — which floats on the water that is poured into the meter, so that when the ball rises it keeps the valve F. open — when it falls the valve closes — and, when it is closed, no gas can pass into or through the meter. The play of this valve is such that it will not close until the water-line has descended so far below its proper level as to give the measure of gas twenty *per cent.* too large.

The meter is filled with water to the height of the hole —(H. figure I). The gas, when the valve F. is raised, passes downwards through that valve into that part of the front chamber which is above water. It never descends through the water, because it is of less specific gravity, but passes from the front chamber through an orifice in the partition separating the two apartments, into the large cylinder, or drum, in the rear apartment, by the tube or pipe — (J. figure I). This tube is represented, in a side view, in figure II. The straight part of the tube is all that is seen in — (J. figure I). It is hollow in all parts, and the straight part connects with the curved part. This pipe has an outlet at the bottom — (K. figure I) — which is, when in use, stopped with a screw. The gas passes from the front chamber of the meter down the straight part of the pipe, and having no other exit, passes through the crooked arm of the tube into the drum of the meter in the back chamber. Both branches of this pipe are cut off just above the level of the water-line, so that if by

* The various figures and diagrams referred to in Mr. Whiting's description, will be found in the Appendix. In the figure I, the letter F should have been placed on the circular valve at the end of the three wires which run through the ball G.

any accident the water-line should be too high, the water will flow into the pipe, fill it up, and thus prevent any gas from passing into the drum. This prevents the meter from measuring off too little, thereby indicating too much on the register as will presently be explained.

The pipe — (B, figure I) — is used for pouring water into both chambers of the meter, and when the water is in, is closed by a screw at the top.* The gas entering the straight part of the pipe (J, figure I) is conveyed by means of the curved branch (figure II) through the orifice in the central part of the division separating the front from the rear compartments, see (figure I) and through the orifice of the convex plate of the drum, (figure III) into the space which is above the water line in the drum *behind* the convex plate (R. figure III) but in front of the parts represented in figure IV. A. figure IX, represents the *side* view of the drum, B. the convex cover, °, the orifice in the division plate P. C. represents the side view of the front compartment — the dotted line is the water-line — the pipe is represented as when the meter is in operation, with its curved part passing through the orifices as above described. These orifices are an inch or more in diameter, — being of sufficient size to permit the crooked arm of the pipe, (J, figure II,) to be inserted through them both (where the upright part stands, as in (figure I) —) without touching them, or in anywise preventing the revolution of the drum. The front plate of the drum, (R. figure III,) is convex towards the front of the meter — being raised in the central portion, say, about two inches above the plain of the perimeter, and soldered on to the front end of the drum, and resembling the cover to a common tin pail with a hole through its centre. This arrangement gives room for the pipe, and space for the gas which has passed through it. After having entered behind this plate of the drum, the gas passes into that part of the drum represented in figure IV — which is a drawing showing the appearance of the drum after this front plate or cover — (R. figure III) is taken off. This drawing represents *the lips of the chambers*, but not the four chambers themselves. They are indicated by the dotted lines.

This portion of the drum is made as follows. It revolves on an axis (Q. figure III, N. figure I, Q. figure IV). It consists of a section of a cylinder divided into four equal compartments, formed by placing four planes of sheet tin so that they shall extend from the circumference to within half an inch of the axis of the drum. The front edges of two of these

* In this figure, the orifice at D, leading into the front chamber, is not represented.

planes are represented by dotted lines in figure IV. These planes are placed at an angle with the direction of the axis, somewhat like the sails of a windmill. The part of the planes nearest the axis is hollowed out, or cut away — as in figure VI — in order that while the wheel is revolving, partly immersed in water, the water may at all times readily find its level both inside and outside of the drum, and may freely flow into and out of the several compartments of the wheel, as they successively rise above, or go below, the water-line. But when each of these particular plates comes successively into a vertical position, the space between its lower edge and the axis is filled with water — so that gas can escape from the chamber in no other place than out of the exit below to be described.

The mouth, or entrance, to each of these compartments of the drum as (B. figure VII) is extended downwards by a thin plate, or lip — (C. figure VII) — so that the gas in order to enter into chamber B. must pass behind plate C. — that is to say, through a narrow space (averaging one fourth of an inch in width,) behind plate C. and in front of the next chamber of the drum — adjoining on the left hand side of B. This adjoining chamber is not represented in the drawing. The gas having entered by this aperture into chamber B. passes out from an aperture constructed like the entrance above described — (A. figure VII). That is to say, it does not pass out directly from the rear part of the chamber, but goes down between the lip A. and the back part of the chamber next adjoining B. on the right hand side. This chamber is supposed to be *removed* in order to represent the exit, in the drawing. This entrance-passage-way, chamber, and exit-passage-way, taken together, extend round nearly one half of the circumference of the drum; — so that when the meter is filled with the proper quantity of water, the mouth enters the water during the revolution of the wheel, just at the moment that the exit leaves the water on the opposite side. In figure V, C. represents the entrance, B. the chamber, the white space above B, the exit — looking from above down into the drum. In the entire wheel there are four of these chambers, thus arranged around the axis, in such manner that the body of the lip of one chamber extends part way in front of the adjoining chamber. And at all times the *entrance* to one chamber must be above water, and the *exit* to another chamber must, at the same time, be also above water.

To illustrate the operation of the chambers of the meter, suppose that a hollow tube be bent into the shape of a spiral spring, and then the whole coil be equally divided by a plane

passing through the axis of the coil — each piece of the tube (resembling in its curve somewhat the twist of a cow's-horn) — of which we suppose there are four — is arranged around the rim of a wheel in such manner that the entrances of the tubes shall be at equal distances apart, opening in front; and the exits shall, by the coil of the tube, be open towards the rear. As the mouth of each tube rises above the water, it fills with gas down to the water's level; when it has entirely risen above water, it is entirely full of gas; when the entrance to the tube plunges again into water, the exit rises above water on the opposite side of the wheel, and the gas is pushed out as the pipe descends below the water-line. This process is repeated four times at each revolution of the wheel.

The water is not disturbed from its level by the revolution of these chambers and the drum which contains them, because, as each chamber is filled with gas, its entrance is, by the revolution of the drum, submerged — the water flowing into the same aperture which, when above water, lets in the gas, and also by flowing in through those apertures of the partition plates above described.

As each chamber, when filled with gas, is, by the revolution of the wheel, entirely submerged, the gas, all the while remaining above water, is pushed out of the exit on the back side of the drum. But no gas can *pass through the chamber* until the *exit rises above water;* and that cannot happen until the whole chamber is filled with gas. As soon as it is filled, the entrance is submerged, and the exit lets out the gas. It operates in a manner not wholly unlike a cutting machine, in which a bar of iron is carried forward by cog-wheels at a certain regular velocity, and pieces are cut off at a certain exact length. Each revolution of the drum cuts off four chambers full of gas, and throws them out at their several exits.

The cylinder in these meters moves from right to left. And to explain the cause of this motion, it is necessary to observe the operation of the gas when it enters one of the chambers. Gas being expansive, or elastic, exerts its force in every direction — but its force is neutralized here in every direction but one; that is, the force exerted on the division plates between the chambers. Thus the force downwards is resisted by the water; the force outwards is resisted by the axis of the drum, and the front and rear sides of the chamber. The only force not counteracted is against these partitions, and they are therefore pressed forwards from right to left; that is, contrary to the direction in which the

gas passes through the drum. And as the chambers fill and empty, in succession, this moving power is exerted with regularity and uniformity, and as the water itself makes some resistance to the motion of the drum which is partly submerged, (and may in this aspect be called a *paddle*-wheel,) this resistance, as well as the friction of the machine itself, requiring the pressure of the gas, (and consequently its density) never to fall below that degree which is necessary to produce motion — tends greatly to produce an uniformity in its density, and, in short, to make the meter *approximate* to a *measure* of *density* as well as of quantity. It will be perceived that as soon as the exit of each chamber rises above water, all resistance to the free passage of the gas is removed — excepting the pressure of the gas which has already passed through the drum; — so that there is, therefore, no force, except that, to counterbalance that of the gas on the right hand side of each division plate. And as gas passing out of the meter by the pipe which conducts it from the back part of the top of the cylinder to the burners, (see fig. 8.) is gradually consumed, the pressure on the back side of the drum is withdrawn, and thus the wheel revolves as fast as the gas passes through. The arrangement of these plates, at an angle with the axis, facilitates the passage of both gas and water through the instrument.

Each revolution of the drum measures a certain fixed part of a cubic foot, or a certain number of feet. And the mode of adjusting the machine so that it will measure exactly one cubic foot, or a determinate part of a foot, is this. The part of the drum which measures gas, is that which is, from time to time, above water — it is the space between the surface of the water and the walls of the drum. That space may be made larger or smaller by raising or lowering the water, just as any measure may be enlarged or diminished, all other parts being stationary, by raising or lowering the bottom. Now the mode of regulating the height of the water is as follows.

The water in the front chamber communicates freely with that in the rear chamber, by the large apertures represented in figure IX. A small hole — (H. figure I.) — is made in the side of the front chamber, stopped by a screw when in use. This hole is exactly on a level with the water line. When the meter is made, it is tested by passing a number of cubic feet of gas through it. If it indicates too much, the hole, which regulates the height of the water line is lowered; if too little, it is raised — and then permanently fixed in its exact place. By opening this hole, if the water

is too high it will run out; if it is twenty *per cent.* too low, the valve F. will close. But as the water in the meter will, by use, continually evaporate, it must be replenished from time to time. And to save the necessity of a constant attendance on the meter for this purpose, a small reservoir — (Z. figure I.) — is frequently attached to it, communicating, by the pipe X, with the front chamber ABCD. The valve — (T., figure I.) — is the place by which it is filled with water, the stop-cock V being closed to prevent the water from running into the meter when the reservoir is filling. After it is full the valve T is closed and the valve V opened.* The pressure of gas — which exceeds the pressure of one atmosphere — upon the water in the meter, sustains the water in the reservoir so that it cannot descend until the water in the meter has fallen below the top of the pipe X. When this happens, the water descends into the meter and gas rises into the reservoir, until the water again rises to its true level, covering the orifice of the pipe X.

Thus the meter is kept so that there can be but a slight variation in its capacity above the water-line; and it is therefore, while in working order, compelled either to stop the flow of gas entirely, by the filling of the pipe — (J. figure I.) — with water, or by closing the valve — (F. figure I.) — or else its revolutions must measure correctly.

Now, if each revolution measures a cubic foot — the next thing is to examine the mode in which the number of those revolutions is indicated by the machine. This is done in a simple manner. On the end of the front part of the axis of the cylinder — (N. figure I.) — is fastened a never-ending screw. This screw turns a cog-wheel — (M. figure I.) That wheel turns an axle L, which by a system of cog-wheels, like clock-work, turns the hands on the dial plate marked "cents." These dial plates are marked, like the faces of clocks, from one to ten, inclusive. A certain number of revolutions of the cylinder is made, by this gearing, to move the index of the right hand dial from 0 to 1, or from 1 to 2. One entire revolution of this index causes the index of the middle dial to move from one figure to the next. So that the first dial shows the number of feet, the second the tens, and the third the hundreds of feet. Or, what is a more common arrangement, the first dial indicates ten feet by the passing of the index from 1 to 2 — and in that case, the next dial indicates hundreds, the third, thousands, and a fourth dial, tens of thousands of feet. The index on the first dial,

* The valve, reservoir, stop cock, and pipe leading from the reservoir to the square chamber, are shown in figure 8.

starting at 0 or 10, moves towards the right; that on the second towards the left; that on the third towards the right; that on the fourth towards the left — and so on — because the first cog-wheel, by which they are carried round, moving itself in one direction, causes that one which connects with it to move in the opposite direction.

Thus the machine operates in the same manner as though a succession of buckets, each containing one cubic foot in measure, had been filled with gas, emptied, and filled again; and the index shows the number of times that this operation has been repeated.

You have thus had, gentlemen, so far as I have been able to make my statements intelligible, a description of the meter and the mode of ascertaining the quantity of gas consumed by each customer. And you will also remember that it was testified to you, that the Company *delivers about eight per cent. more to consumers than is ever accounted for or paid for.* They make allowance for leakage, and for all errors which experience has shown to be nearly unavoidable, but, after all, are glad to escape with a loss of only EIGHT *per cent.* — which loss arises either from the meters being out of order, or from a registration of less than the number of cubic feet of gas actuallly consumed. This fact is proved by the testimony of the former foreman of the works, and by a comparison of the Company's books of charges and receipts, with their records of manufacture.

It is also established, beyond controversy, so far as any fact can be established by testimony, *that all errors of the meter*, the measuring instrument, *are*, in point of fact, *against the Company* and *in favor of the consumer.* The same proposition may be demonstrated also by a statement of the principles of science involved in the construction and operation of the machine. Let us look, for a moment, at these errors and their causes — taking care to regard and ascertain them all. It is obvious that there are several cases in which the amount of gas consumed will not be correctly indicated by the register — provided the meter is out of order. But what are the consequences?

Take the register for example. This, if it goes at all, and is in order, must go truly — for it can move only when a force is applied to it, and must move just according to the amount of that force. But it may be that, in course of time, *a cog on one of the register wheels is broken or worn off.* The gas will cause the drum to move regularly, but the missing or imperfect cog prevents the motion from being communicated to the hands of the dial plate, and the error

of registration will be great or small, according to which of the wheels is imperfect in its cogs, and to the length of time during which the index ceases to move. The loss to the Company will be in exactly the same ratio.

Then, again, if the cogs are clogged up, the friction of the machine being so much the more, the gas must by pressure acquire a greater density in order to produce motion, and the movement of the index hands is just the same, whether the gas be more or less dense. This, also, is a loss to the Company.

Then, too, with regard to *the endless screw, fastened to the axis of the drum* by a pin, as you have seen. The pin may possibly *slip out*, and therefore the drum, in its revolutions, may fail to move the screw, and consequently no effect whatever will be produced upon the register. It stands still. This is a case which has actually occurred. Here, too, the Corporation are losers.

But there is another cause of error, more common than either of these. It arises from the *corrosion of the tin plates which form the drum of the meter.* It is sometimes found that a hole is eaten through one of these plates by rust, and as, by natural laws, the gas will escape by the shortest and easiest vent, a portion of it will run through the hole without producing, or aiding to produce, any motion of the drum. Thus more gas will have passed through than the register accounts for. And this error the Company can by no possibility detect, unless there should be so striking a variation between the measurement of the register and the amount of gas supposed to be burned, as to lead to an examination of the meter and a discovery of the imperfection.

But in all these cases — as you see, and as no one can deny — the errors, whatever they may be, are invariably in favor of the consumer and against the Company. *Because the register cannot possibly indicate the passage of more gas than has been used, whereas it may record the escape of much less.*

There is another thing to be remembered. The axis of the cylinder, the never-ending-screw, and the wheel on which it immediately works, are under water. Now water such as we generally use will produce a chemical action of decomposition on metals, and the motion of the drum in water will cause that water to thicken with the oxide of iron and other substances. By this process the friction of the wheels and axles is increased, their motion is retarded, and the motion of the register likewise made slower. Should rust gather upon the wheels, every one sees that it would

require more and more force to move them. And every body knows that any machine, though perfect at first, becomes less and less perfect from use, by friction, rust, wear and various other causes. Just so it may be with these meters; but increase of friction requires increased pressure, and therefore increased density of gas to produce motion — whereby the consumer gets more gas crowded into his cubic foot measure than he is really entitled to. And — as cannot too often be called to mind — all the results of such imperfections enure to the benefit of the purchaser, not to that of the seller.

The falling of the water-line in the meter is one more source of an inaccurate measurement. And this is constant; for water will evaporate at any temperature of the atmosphere, and a current of gas passing over water will always carry up with it some of the vapor of the water. The process is slow, indeed, in some cases, for it depends upon the larger or smaller consumption of gas, and the temperature of air in which the meter stands — but it is always going on, and its tendency in these meters is always to reduce and lower the water-line. The instruments are regulated so as to be correct at first, and they generally remain in use from three to six weeks before the water level is looked at. The effect of the constant evaporation that has been going on for those three or six weeks, is to give the consumer so much more gas — be the quantity greater or smaller — so much more gas than is recorded against him by the register of his meter. There is no action of the machine by which the water-line can be unduly raised, or raised at all. There are no tides in it. The water is a fixed quantity, except as regards the evaporation. And neither is it possible, by any means whatever, to keep the water-line too high, and at the same time to keep the machine at work. For even suppose some "*paid servant*" of the Company, some rogue, should put too much water into the meter, or should even fill it full. What then? From the construction of the interior branching pipe which I have explained to you, the pipe which conducts the gas into the cylinder, is at once filled with water by the undue raising of the water-line, and then not a particle of gas can pass through the meter, nor a single revolution of a register wheel be made. Thus you see that the Company have in all instances provided means, the moment a meter begins to tell a story too much in their favor against a customer, to *shut its mouth at once.* If a meter register stops moving from rust — of which you have had an instance in evidence — and does not mark the gas burned, is that an

error in favor of the Company? Certainly not. You have testimony to their custom, in such cases, to receive just what the consumer thinks he ought to pay — or nothing, if he sees fit not to pay any thing. But if the meter stops from having too much water in it, the register cannot move at all, the consumer can get no gas, and the evil must be remedied before a single cent can be charged against him.

It is true that the Company have provided a mode of securing themselves in some degree by means of the floating valve in the meter. I admit that fact. But the valve will give them no notice until their loss amounts to a very considerable fraction of the whole amount consumed. The testimony before you is that from the action of the floating valve, the error never can amount to two *per cent.* in favor of the Company, while it frequently reaches twenty per cent. in favor of the consumer. And the *average error* from this cause is about *fifteen per cent. against* the plaintiffs. The English Gas Companies so arrange their meters that the water-line, — constantly falling as it must be — is set above the average line at first, so that when it comes at last below it, they think they attain a *just average.* In the commencement of a period when the water line is adjusted, the measurement is against the consumer, but at the end, in his favor — and the medium is what they seek to acquire, as being fair for both parties. In our machines and by this Corporation no such thing is done; for the Company would much rather furnish an eighth more gas than they charge for, than charge for one five hundredth part more than they furnish. The error may, you have seen, be two *per cent.* in our favor, at the moment when the line is adjusted — but before it is re-adjusted it frequently is twenty *per cent.* against us. Supposing the evaporation of the water uniform, the fall from two *per cent.* above to twenty *per cent.* below the true line, gives an average of eleven *per cent.* against us. These calculations confirm the testimony of our witnesses — that the average loss to the Company is from eight to twelve *per cent.* of the whole quantity manufactured and delivered. They are always content to get off with a loss of eight *per cent.*

I believe now, gentlemen, we may pass to the *errors of registration occasioned by the tipping of the meter — its variation from a true level.*

Suppose that at first the meter is placed on a platform, or shelf, perfectly level. Ordinarily the shelf is made of stone, marble, board or plank. If of marble, or other stone, it may be displaced or disarranged by extraneous force. If of board

or plank, it will probably be warped by the alterations of temperature, and consequently the meter will be canted more or less, forward or backward, to the right hand or the left. What is the consequence? If it tips forward, the water is sent in an undue quantity to the front part of the machine, that is, into the front apartment, and that error operates against the Company. Because the rear chamber, as every one sees, is of much greater capacity than the front, and a slight alteration of level in the rear will produce a much greater change in the front chamber, and thereby correspondingly increase the capacity of the measuring part of the drum. In other words, the water falls in the drum, and leaves more space for gas. So that in this case the dial will show a less consumption of gas than has really taken place, because it requires more than one cubic foot to cause a complete revolution of the drum. But if the meter *should tip backward* — which is the only case in which the error can possibly favor the Company — then, by reason of the difference in the relative size of the front and rear chambers, the error in this case is very trifling — and much less in favor of the Company, than the opposite error is in favor of the consumer. A homely, but serviceable illustration of this, may be found in a common tea-pot. The body of the vessel is the rear chamber of the meter, while the spout represents the front chamber. Every body knows, that a very slight alteration by pressure in the level of the liquid in the body of the tea-pot will produce a very perceptible change in the height of the liquid in the spout — whereas a considerable change of level in the spout will hardly give an appreciable alteration of the height of liquid in the body of the vessel. The difference in the error of the meters, for or against the Company, results from the difference in the size of the chambers, and is exactly in proportion to their respective cubical contents taken below the water line. You see these proportions in the machines before you, and need no argument from me, gentlemen, to enable you to estimate their relative amounts.

With regard to the sideway tipping of the instrument — from the right to the left, or from the left to the right hand — you remember that the question was put to several witnesses, and that they all testified that this circumstance could not make the least appreciable difference in the performance of the meter, if it were, in other respects, in order. A circular measure will hold the same quantity whichever way you tip it. Certainly no error from this source has been shown to exist in the present case.

Such then, gentlemen, are the defects of this machine for

measuring gas which we use. And I believe you must be satisfied that my colleague's assertion — that its errors, if any there be, in almost all cases are in favor and to the benefit of the consumer — is completely demonstrated.

Now I am willing to go still further, and compare this machine with any measure in common use, known to, and recognized by the law. Take for instance the well-known measure of wheat — which is worth say from two to three dollars per bushel — or corn, worth from sixty to seventy cents per bushel. That measure is made of wood, which is liable to shrink or swell, as we all know, with every change of temperature and of the moisture of the atmosphere. You remember Mr. *Hibbard's* testimony, that wood will commonly shrink a quarter of an inch to every foot from unseasoned wood to dry. From wet to dry, it would shrink much more. Kiln-dried wood will absorb moisture or water, by the capillary attraction of its pores, like a sponge. Now these bushel measures are made of wood, and are often rather more than a foot high; and the shrinking of a quarter of an inch to the foot would render them quite inaccurate. The common metal measures, of copper, iron or tin, shrink or expand about a thirty-second part of an inch to the foot, in the usual atmospheric changes. They are, therefore, all, only an approximation towards accuracy, and, though theoretically correct and true, cannot be so practically. It may be said indeed that these aberrations in the measure are corrected and neutralized by the contraction or expansion of the articles measured, but this, though true to some extent, does not remove the difficulty — because there is no comparison between the expansion of grain, spirit, or water, and that of the wooden or metal vessels by which they are measured. The expansibility of water, for instance, compared to that of iron, *under common atmospheric changes of temperature*, is almost nothing. There never was any machine in the world which, to the eye of science, could not be demonstrated to be imperfect. There never was a measure of water, of spirit, or of any gas, precisely accurate at all times. And it is perfectly futile for my opponent to pretend, because a meter may at times be slightly — and but very slightly, out of the line of perfection, that therefore you, as reasonable men, ought not to trust to its actions — not to believe that we have delivered that number of cubic feet of gas which it registers as having been delivered and consumed — that we have charged this defendant with gas he has not had. But it is contended that if you are not satisfied that the meter is *absolutely unerring*, the defendant is not bound to *pay any thing* for our

gas which he has burned! How will this doctrine appear, when applied to other branches of business?

Every trader in dry goods has his yard-stick, and measures by it always. Wood, we know, will not perceptibly shrink or expand *lengthwise* — and therefore wood is frequently used for the pendulums of clocks — but it will warp, and the yard-stick will become too short by reason of that warpage. If the measure of a piece of cloth should prove to be one hundredth part of a yard too short, would you not deem it absurd to refuse to pay the shop-keeper of whom you bought it, *any thing at all*, unless he could demonstrate that his yard-stick was absolutely accurate? The common pound weight used by the grocer, is continually gathering foreign substances to its surface, and that increase is a loss to the grocer. But it wears out and becomes lighter by friction, and that is against the buyer. Therefore the law requires that weights shall be periodically examined and sealed. These weights are never absolutely just. But in every day transactions in buying and selling all grosser commodities, weights slightly inaccurate are continually used without complaint or practical injustice on either side. But if the weights and scales whose correctness you are testing, are to be used in weighing diamonds or precious metals, a far greater degree of accuracy is necessary. The degree of perfection which is practically requisite, depends upon the value of the commodity to be measured. Gas is a cheap article. It costs but *three and one half mills per cubic foot:* that is to say, less than *one cent and a half per barrel*, and therefore the highest exactness in its admeasurement is not really important.

The fact is, that you may examine all weights and measures of commodities, and you will not find one entirely accurate, in use. And this gas meter of ours is the only instrument among them all, whose errors, by the construction of the machine, necessarily operate in favor of the party that buys, and not of the party that sells by it. It is certainly a most beautiful contrivance, — and must have been the result of a high degree of mechanical skill, united to a profound knowledge of some of the laws of physical science.

We may now pass to an examination of other objections raised by the defendant's counsel to the practical operation of these meters in their connection with the pipes. And he must permit me to say, that no ordinary degree of preparation for this trial, would have enabled any person to set forth such an array of obstacles to our action.

Mr. CHASE said that he knew nothing at all of the matter, before engaging in this case.

Mr. WHITING resumed. Then I will say that my very chivalrous antagonist has seized, as by intuition, upon all possible objections to the machine. And whether his own reflection suggested them all, or whether other discontented persons have poured their complaints into his ear, and his mind is now reflecting the disjointed image pictured by rays of light from many scattered sources — he has nevertheless become the organ through whom all that have aught against us have been heard. We are glad to have them heard. We are very glad to have the opportunity of asking you to tell your neighbors whether we are that combination of knaves and rascals that we are charged with being! Whether it is our habit and custom systematically to cheat those who deal with us, and pocket their money without rendering an equivalent!

But let us hasten to consider the first objection the gentleman takes to the operation of our machinery — It is, that though the meter, when in order, may accurately measure a cubic foot of gas, still it does not register that cubic foot which we deliver, or profess to deliver. In other words, that the same cubic measure of gas of *different densities*, will give a greater or smaller amount of light according to its density, but the measurement and charge are the same, be the quantity of light more or less. This is certainly, in a theoretical point of view, an objection to the meter. But to what extent does it obtain, and in whose favor does it operate? We have testimony as to this on both sides.

Mr. *Blake* has testified that the gas is delivered at different pressures, and consequently different densities, at different points — but that this *difference is so very small as not to be appreciable.* That it is so little in a foot of gas under a single atmospheric pressure, and under the additional pressure of one, two, or three inches of water, that he does not believe it could possibly be estimated by any instrument or machine which is used for measuring gases. If this be true, the error is of absolutely no consequence. And Mr. *Hibbard*, though he states that there is a difference, has shown how very little it must be. According to his evidence on the cross-examination, the difference in the density of a foot of gas at the pressure of the atmosphere, or fifteen pounds to the inch, and at the additional hydrostatic pressure of two or three inches of water, would be as the proportionate difference between the weights of two columns of water, the

first thirty-three feet, and the second, thirty-three feet, two or three inches — not far from the two hundredth part of the whole, or half of one per cent. But in truth, the difference in the height of the column of water which will counter-balance the pressure of the gas, at different points along the line of the street mains, at any one moment, will not vary more than from half an inch to one inch; — thus reducing the variation of the density of gas to half the amount above calculated — that is, to one quarter of one *per cent.* The density of the gas in the mains is equalled effectually by having two main supplies at each end of the city, as will be hereafter explained. Such an error as arises from this source is not very important.

But there is something more to be said on this. I admit that the error does exist — I will say it is appreciable, if you please. But in whose favor does it work? In the Company's? No! In the consumer's? Yes, clearly! If a certain quantity of gas at an atmospheric pressure occupies just a cubic foot in space, any additional pressure will lessen its bulk — and just so much as this is lessened, just so much more gas must be forced in to fill up the cubic foot. And the more the gas is compresssd, the more will be distributed for every foot of measurement. That is the testimony on all hands. Now it is plain that we cannot supply our gas at simple atmospheric pressure. We must employ more force to send it through the mains, service-pipes, and meters — and the greater the length of our pipe and the number of our meters, the greater pressure we must use, and the more gas, in proportion, we must expend. The more force we apply to move additional machines, the more gas we furnish to customers, both old and new. Say we supply now 2500 consumers — if the number were increased to 5000 to-morrow, it would be money in the pockets of all of them. We can do but so much work with a given force, and it is a fact that the Corporation has been constantly obliged to increase the pressure since the works began. And till Mr. Gault came forward, nobody has been found to complain of thereby getting more gas than he got before for the same money.

There is one material error in the argument which the learned counsel has pressed upon you, gentlemen, which may be disposed of in few words. It is not, I presume, an error of his own, but of his client's — for certainly no man of science could seriously entertain it. He has urged at some length that the *density* of gas is *the only true measure* of its value, and is far the best measure of its illuminating power. Now

you have had it proved in this very case, that the plaintiffs here, are obliged to go to much trouble and expense, to expel carbonic acid, sulphuretted hydrogen, and carbonic oxide, and other impurities, from their gas as it is generated. But the gas would be twice as heavy, or dense, if they should allow the carbonic acid to remain, and if density were a criterion of its power of giving light, why should they be at this expense only to diminish the amount of light they supply? They might make their gas heavier merely by neglecting to purify it, but should they do so, you would soon find, gentlemen, that their gas would not be worth having at any price. No! This is a most unfounded pretence that density is the measure of value. The illuminating power depends upon the relative amount of carbon which is united to the hydrogen in chemical affinity. I admit that if two cubic feet of good gas are compressed into the space formerly occupied by one, the compressed or denser foot, other things being equal, would burn twice as long as the other. But that is not the point which my learned brother maintains. He contends, that under equal atmospheric pressures, the difference in density corresponds to the difference of illuminating power — and this we have seen is an error. He says, again, that the illuminating power may be measured by the *specific gravity*, provided the gas is constant — that is, just the same — made of the same materials in the same relative proportions. Yes, that may be true as a scientific fact, but it will not do as a practical measurement — because first, the gas might not be constant — its specific gravity may be increased, just as its density is, by omitting to purify it — and no machine or instrument has ever been contrived to measure the density or specific gravity of gas as it passes through pipes to burners. His own scientific witness, Mr. *Hibbard*, says he never saw, read of, heard of, or dreamed of such an instrument. The learned gentleman thinks one might be made. When he has found it, let him show it to us, and, if it is accurate, he may be sure that this Company will make use of it.

Moreover, upon this point of illuminating power, does the Company agree to furnish its customers with so much light, or with so much gas? Is it light, or gas that light is made of, which they agree to supply? That is the question. The learned counsel has made a mistake here in his argument. We did not agree, as he supposes, to sell his client so many cubic feet of light — but so many feet of gas, and it does not matter at all what the illuminating power of that gas might have been.

We come now to another point in the case — but let me say, in passing, that I believe I have answered, to the best of my ability, all the objections brought against the meter — as not being an accurate machine, or a measure of density, or specific gravity. I have given you two classes of proof, as to the correctness of the machine — proof by practical experiment, and proof by scientific demonstration. I have discussed all its errors, and you will have seen, I think, that they all operate in favor of the consumer, and against the Company.

The second proposition that I stated, gentlemen, was, that the defendant, in this case, *is bound to pay for the number of feet of gas registered by his meter, during this quarter in question.* This is a question of law simply. If Mr. Gault had been accustomed to take and use gas, and to pay for it as registered by his meter at a rate uniformly charged, then, unless he had given notice to the contrary, he is bound to continue to pay at the same rate. That doctrine is true with regard to every man who takes gas of the Company. If, for quarter after quarter, any one has burned the gas, and paid his bills, and has not objected to the mode of measurement or rate of charge — then, if he continues to use the gas, by the law of the land he is bound to pay for it according to the same measure and rate, until he gives notice of his objections. Now if this be so, as the Court will, without doubt, instruct you that it is, then it becomes important in this case to establish the fact that the defendant has previously so taken and paid for his gas. But Mr. Gault has admitted that fact, and produced before you sundry gas-bills, which he has paid. That question is settled. Nevertheless, since some one of you might be disposed, without further consideration, to decide this case upon this ground provided you could be satisfied that law coincides with reason, I will endeavor, with your permission, briefly to illustrate the good sense and equity of the proposition. For though it be clearly the law, I should be ashamed to urge its application in this cause, were it not perfectly in accordance with the principles of justice.

Suppose that you, Mr. Foreman, have been for some time in the habit of dealing with me for some article of traffic — such as corn or wheat. You have repeatedly bought of me so many bushels; you have uniformly received the quantity I have sent to you for that number of bushels, and, knowing the measure employed, have never objected to it, and have paid the bills I have sent for the article. Suppose you give me an order to-day for another lot, and I deliver it

according to custom, and by the same measure as usual. You cannot to-morrow turn round upon me and say that you doubt the correctness of the measure, and therefore will not pay the bill, since I furnished you with the wheat according to the faith of our agreement, and if you meant to dispute the measure, you should never have taken and used the article. If you wished to rescind the contract you should have returned the goods furnished upon that contract. Any other course would be a fraud upon me — it would be taking away my property without rendering me any compensation. A course of dealing, in the eye of the law, creates a contract that the parties will conform thereto. This is a principle which is applied to every day's business. A merchant is in the habit of shipping cargoes to his consignee abroad, and the consignee has instructions to insure, or is accustomed to insure those cargoes. He neglects however to effect insurance upon some one cargo, of which he has had advices, and that particular cargo is lost. Upon whom does the loss fall? By the rules of law, it falls upon the foreign consignee — because he has not complied with the established custom of dealing between the parties. When a man, in his dealings with another, does not do as he has been accustomed to do — no notice to the contrary being given — the law makes him responsible for the consequences. A person keeps a livery stable in the city, and one of your sons, being under age, is in the habit of hiring horses and carriages. You are not bound to pay the bills thus accruing, since they are not for necessaries furnished. But if you have been in *the habit* of paying those bills, you cannot without notice refuse to pay the last one rendered. The law will compel you to pay it. And why? Because otherwise it would be a fraud upon the stable-keeper. Why did you suffer your son to hire of him, month after month — why did you pay his former bills without informing him you should pay no more? By your conduct you have contracted with the stable-keeper that the bills should be settled, and the law will hold you to fulfil that contract. No, gentlemen! There are rules of honesty and good faith in all human transactions — and they are just as applicable to business with this Company, who deal in gas, as to any other corporation or individual, let him deal in what he may. I will detain you no longer on this topic, because you understand it well. We ask for nothing but fair dealing. So much, I am sure you will enforce.

Now, let us see what is Mr. Gault's defence — upon what platform he stands — what points he has made, and how he has supported them?

In the first place, he came into Court *denying that he had had any gas of the plaintiffs*, and he has stuck to that denial for two or three days. Considering the evidence which afterwards came out, I leave it to you, gentlemen, to pass such judgment as you please on *such* a defence. I will not undertake to characterize it. Knowing as he did that his apprentice — a boy suckled at his bosom, if there could be such a thing as a "nursing father" — would testify and must testify that *he had burned* some of the Company's gas, during this quarter, that man sat in court, day after day, instructing his counsel to deny that he ever had any of it. That shows the extent of his fairness, and of his reluctance to attempt to blind the eyes of the Jury! This ground of defence, however, has sunk from under his feet.

Next, the learned counsel denies that *our meter is a legal standard of measure.* It is, he says, a measure not known to the laws of the Commonwealth. This I am free to admit. The Commonwealth has adopted certain standards to which all common weights and measure must conform. But the gas meter is not a common weight or measure used for the purposes of traffic. And it is new to me that the government either of Massachusetts or of the United States, *has ever established a standard for the measurement of gas.* The meter is a measure of the philosopher, not of the lawgiver — just the same as any other scientific instrument. But it is urged, *we are liable to a penalty* for measuring and selling gas by the meter! This objection may be disposed of like the other. The government has established no criterion for the measurement of a cubic foot of gas, though it has established the dimensions of the standard quart. Nothis more certain than that a cubic foot is a cubic foot — its contents are equal to the contents of a space of twelve inches in each dimension. But a quart measure is a different thing. That contains only a certain portion of a foot. It makes no difference how we measure the foot of gas we deliver to a customer, if he gets the 1728 cubic inches we agree to sell to him. It makes no difference to the purchaser whether his ten bushels of corn are measured in a ten bushel bag, or in ten separate bushel measures — whether his ten feet of lumber are measured by a ten foot pole, or by a one foot rule — so that he gets the quantity he bargains for. And if we are subject to a statute penalty for selling gas by this meter, why then let the Commonwealth come on and prosecute us. The Corporation will not run.

The third point of defence is, that the Corporation *has sold more gas for the* same money, to *some persons, than to*

others. Or, that, out of ten persons, for instance, more has been charged to one or two of them than to the rest, for the same quantity of gas. This assertion I meet with an unqualified denial; I prove its *falsity* by the *books of charges.* You may take at random ten thousand different charges in the books, and I defy you to find one single instance where the same amount of gas is charged differently to different persons, or where, for the same money, different quantities of gas have been supplied. This accusation is totally false. It is a calumny upon the Company, originating in some foolish complaints of groundless discontent, or some idle conceits of ignorance. Observe what we have proved. We have brought the Company's books into Court, and no such thing can be found in their pages. You will have them, and can examine for yourselves. We have brought the clerks, and they swear directly that the entries in the books of charges are true entries from the register-books. Mr. *Stearns* swears that since he has been clerk, in every instance the entry is a true record. And it has not even been attempted to impeach this testimony. And all customers are charged at a uniform rate. But even suppose Gault's pretence were true — what then? If Gault agreed to pay so much for his gas, he is bound to pay that amount — and it makes no difference to him what we charge other people for theirs. It would be a pretty state of things if a merchant who had bought a bill of goods at an *agreed price*, should refuse to pay for them because the house of whom he purchased had sold similar goods to his neighbor or any body else, *at a less or a greater price.* The objection is senseless.

Again, it is said for the defence that gas bills are sometimes *made out by estimate*, and not by the actual measurement of the meter. Suppose this to be true — what bearing has that fact on the merits of this case? Is not he bound to pay for what he has had, and knows he has had, even though bills may have been made out to others upon estimates? But suppose that the bill in suit had been an "estimated" bill — would there be any thing unnatural, or dangerous in resorting to an estimate, if the necessity for it existed? Suppose a corn merchant is accustomed to supply a stabler with grain and to have large dealings with him. He knows the usual weekly or monthly consumption of his customer, and that he is not in the habit of buying of any body else. On looking over his books for the quarter he finds no charge of grain to the stabler for a particular month, although he knows that the usual quantity was supplied; he makes out his bill including *an estimate*, for that month, based upon the average sales for similar

periods. The stabler pays it or not, as the case may be. But is the fact that this bill was made on *an estimate*, any reason under heaven why the stabler should refuse to pay the same merchant for the ten bushels of corn which he knows he has had? And if such an estimate would be reasonable, why should not the Gas Company resort to an estimate, in case by accident they have lost their registration? As to the statement itself — that estimated bills are sent out by the Gas Company — it is true, and I am glad the fact has been proved. You have had before you, one such bill, and you heard the reason of its existence. The man's meter had stopped, had registered nothing for the month, though gas had been burned; and in this case, as in every other like it, it was left to the *consumer's honor to pay what he thought proper*, or even to pay nothing if he should feel disposed so to do. Mr. *Johnson*, like an honorable man, paid the bill because he thought it about right. But, gentlemen, I am proud to say, as a proof of the extreme regularity with which our meters work, that you may take any of the late years, and, out of the ten thousand bills annually made out, you will not find five made on estimates. This is a fact — and a fact which sets at rest, at once and forever, all this hue and cry about the Company's *guessing at* the amount of gas their customers burn. It proves conclusively, that we do not go by guess-work, as has been so often stated.

In this connection, too, the learned counsel again alluded to the plaintiffs as constituting a "*monster corporation*." I did suppose, from his opening remarks, that he too, like most of us, had got beyond that period when it was considered allowable or effective, to attempt to prejudice the jury by the stale and senseless cry against "Corporation." He told us he should attempt no such thing towards you, gentlemen. But I thought, when he did thus endeavor to prejudice you against the few of your neighbors and friends, who constitute this Gas Company, that he had strangely forgotten himself, and was practically treating the jury as though their minds were very vulgar. As to the additional assertion, or insinuation rather, that similar "monster corporations" have elsewhere been defeated in similar suits — that has before been answered.

But, once more, the Defendant takes the position that though the meter, when in good order, may be a reasonably accurate measure, *yet it has not proved true in several instances* — inasmuch as *some persons have used more burners, and for more hours, than others*, and yet have *been charged only for the same quantity of gas*. And to establish this po-

sition, the whole army of the discontented has been mustered forth. Let me ask — to what effect?

This Corporation has now been in operation some fifteen years, and during that time the demand upon it, has, from a feeble beginning, grown to the supply of some twenty-five hundred customers. Every one of these has a bill rendered once a quarter at the furthest — many, once a month — and some, once a week. Out of the hundred thousand bills to these twenty-five hundred consumers — out of these hundred thousand accounts rendered to, and settled by, men now mostly within reach — out of all these bills and all these accounts — some ten or twelve only are brought before you by the defendant. A small fraction truly of 100,000 — a very small fraction even of 2,500. Every body has, for months past, known of this trial through the public prints. Every man who had any complaint to make, has had an opportunity to come forward with it. It is not alone the case of Mr. Gault, the immediate defendant, that is before you, but all the cases of discontented customers of the Gas Company for years past. This particular suit itself is not new. It was commenced some months since — it was on the docket for the last term of the Court — there has been a succession of counsel engaged in it — there has been abundant opportunity, time enough and scope enough — for every circumstance that could possibly bear in favor of the defendant, or against us, to be brought forward, fully and completely. And what do they all amount to? Let us examine the evidence a little

The testimony relied upon in this part of the case, may be divided into three or four classes. In the first group we may place Messrs. *Aborn*, *Cook* and *Weeks*. Mr. *Aborn*, in the last quarter of 1847, burnt from twelve to fourteen burners, and his bill was $43.40. Mr. *Cook* used fifteen burners and paid $46.90. And Mr. *Weeks*, with seventeen burners, in the Reading Room, where a great deal of light is needed, was charged $70.00. I don't know of any bills upon our books that show more favorably for us than these. With regard to Mr. *Weeks's* bill for the succeeding quarter, that was only $52.85 — but the reasons for the diminution were well explained by him. He testified that much greater care and economy of light were practised. And in regard to the testimony as to the consumption of gas in the Reading Room, we have another specimen of Mr. Gault's honorable dealing. Fair play, gentlemen, is a jewel — whether it glitters upon the kingly crown, or on the breast of the humblest artisan. Where has Gault shown us "fair play"? What was his course in procuring the admission of Mr. *Weeks's*

testimony, as to the instructions he gave to his porter, and his porter's conduct under those instructions? You remember, gentlemen, that there was a serious struggle between my opponent and myself upon the admission of this evidence, and how the Court ruled, upon the understanding that the porter would be put upon the stand by the defendant. I do not at all believe that the learned counsel would for a moment think of playing false with the Court and Jury, or that he would take any course not justifiable according to the instructions of his client. And if the defendant instructed him that this porter should be produced as a witness — and this he must have done — the course he took was not objectionable. But what is Mr. Gault's position? The instructions of Mr. *Weeks* to his porter were admitted, but Mr. Gault never produced that porter. Now he must either have suggested a falsehood to his counsel or else have dealt unfairly and dishonestly towards us, or else — having seen the porter — found that his testimony would be ruinous, and therefore determined not to call him as a witness. This is not what I call fair play. A client is always bound to make his counsel's word good. I did not care about the testimony of Mr. *Weeks* on this point, except in so far as the principles and rules of evidence were concerned.

Next comes Mr. *Gove*, in the second division. He used nine burners — one throughout the day and the others from dark till eight o'clock — and his bill for this quarter was $15.40. But no comparison is made between him and any body else, and his evidence has no bearing whatever on this case.

In the third group we find Messrs. *Carruth*, *Burbank*, and *G. L. Johnson*. The first testifies that during this quarter he used four burners, two in each of his stores, and that the aggregate of his two bills was $13.30 — one store being charged $9.45, and the other, $3.85. But it does not appear that he burnt equally in both. If he did, then one meter must have been out of order, and did not register correctly. He commonly lighted up at the usual time, and kept burning till nine or ten o'clock. In the corresponding quarter of 1842, having then but one store and using six burners of another kind, his bill was $25.00. He worked in the cellar and burnt gas there. Messrs. *Burbank* and *Johnson* testify to the number of hours they used their respective burners, but their bills, as I am persuaded you will find on comparison, show no discrepancy of any moment between the charges made against them, and those made against other persons using the like number of burners for similar spaces of time. There

are thousands of just such bills in the Company's books. The last evidence of any importance, in this part of the case, is that of Mr. *Kimball*, of the Museum, who states that when he shut off twenty-five of his one hundred burners, the quantity of gas consumed was not lessened in the least. This is easily accounted for when we remember that his lights were all supplied by one service pipe from the street main, and that shutting off some of the burners would only operate to increase the pressure upon the rest. It proves too the fact for which we contend, and to which Mr. *Blake* testified, that, in a given length of time, *more gas may be burnt in four burners improperly managed than in six adjusted to advantage;* and that any number of burners injudiciously used, will not give an increase of light, at all in proportion to the increase in the quantity of gas consumed.

Gentlemen, I have done with this portion of the evidence. I have spent, perhaps, too much time upon it, since it all amounts to nothing, as you see. But it was necessary to go into it somewhat at length, in justice to my clients, and to obtain a full understanding of the whole matter.

Now, what are the fair inferences to be drawn from all this testimony? I draw two; — First, that all these bills pretty nearly correspond to the amounts of gas *thought* to be used, by the consumers themselves. They compare as well — nay, far better — with such estimates than would, for instance, the actual amount of water which a man might drink during a given period, with his estimate of that quantity. And, second, that they fully support the reasonableness of our charge, considering the number of burners used and the time during which they were kept lighted. It is to a cent the same sum charged to another man, — (Mr. *Burbank*) — who used exactly as many burners for just about the same length of time; during this very quarter — and whose bill for the quarter has been put into the case. We could not have, and would not ask for, better evidence than this in our favor, if it be entitled to any weight.

Now, gentlemen, as to this particular case of Mr. Gault's. An attempt has been made to mislead you by the statement that *during the first quarter* as to which question has been made — that ending January 1st, 1847 — *he used six burners more hours than during the quarter in suit*, when he used *only four burners*, and shut up nearly an hour earlier than before. *Otis Foster* is the only witness for Gault upon these points, and I don't wonder that the counsel thought it necessary to endeavor to patch and bolster up his testimony. This *Foster* is a lad learning his trade in Gault's shop —

eating at Gault's table — and sleeping in Gault's house. He comes on to the stand apparently eager to tell all he knows in favor of his master. He has been made to swear that during the fall quarter of 1846, six burners were used all the time in the evening, while during that quarter of 1847, only four, and not always so many, were lighted. Had this statement been a fact, this testimony uncontradicted — still I should have asked, what of it? For we have proved in your presence, by actual experiment, that a single burner can be made to consume from twenty-three to twenty-four cubic feet of gas in a single hour; and one burner could consume in a fortnight more than is charged to Gault for the whole quarter. But his statement is contradicted by Mr. *Turner*, whose evidence I shall come to presently. But we heard nothing from the able counsel on the other side about *Foster's* being prejudiced in favor of Gault — not a word about his being the *defendant's hired and paid servant.* He is the bounden apprentice of Mr. Gault; he is subject to his blows — ay, gentlemen, by law his master may inflict personal chastisement upon him, if he has cause — but not a syllable of all this do we hear even whispered. I will not say that the witness does not mean to tell the truth — but even since this very trial commenced, he admits that he has talked with his master about it more than once, and it is impossible but that his mind should be influenced and his recollection of facts overshadowed by his secret communion with such a personage.

His evidence, however, such as it is, is completely overthrown in more than one way. It does so happen, as has been sworn to, that in the last quarter of 1846, Gault complained of his gas fixtures and of his lights. The pendant in his window was so arranged that if the gas were lighted it would break the glasses and set fire to the goods hanging on the frame in the window, as he said. Yet *Foster* swears that those window lights were used during that quarter, and still he states that the fixtures were not altered till three or four months after Gault moved in — and that Gault did move in about the last of September in that year! So much for *Foster*. *Turner* went by Gault's store every day during that period, and he never saw those lamps burning. *Turner swears, too,* that Gault told him he had been there three months and had n't been able to use his window lights, and didn't see why he could not be attended to as well as others who wanted to have their gas lights fixed. There 's Gault's word for it — in flat contradiction of *Foster*. *Turner* also testifies that the lights *could not* have been used as they then

were, without breaking the glasses, and probably setting fire to the goods. But further and better yet. It appears from incontrovertible evidence that the fixtures for the window lights were improperly put up. Hooper's men who arranged them plugged up the wall pipe so much, screwed the pendant pipe so far into it, that *no gas* at all *could* escape into this last pipe and be burnt in the window burners, until after they were altered; and they were not altered until nearly the expiration of the quarter. That fact is sworn to by the men who altered the fixtures, and it is a complete *demonstration of the impossibility* of *using* those two lights in their original state. And yet that man, the defendant, sits by his counsel's side, authorising and instructing him to assert, and argue upon, a falsehood — yet his boy swears point blank to the statement — that *six burners*, all there were in the shop, were used during the whole of that quarter. Whereas the fact is that the window lights were not used at all — at least not until near the very end of the quarter. So that it turns out that four burners were used in each of the two quarters, except perhaps for two or three weeks in the first, after the fixtures had been altered so that six might then be lighted. And the bill for the second quarter is less by one or two dollars than that for the first. See now how *Foster* appears. Swearing to a falsehood — contradicting himself in three or four instances — contradicted by his master's declarations to *Turner* and others — contradicted by *Turner's* direct and positive testimony — and contradicted by established facts. What weight can be attached to his evidence in the only points where it has any force in favor of the defendant? None whatever. The result of all the evidence is simply this — that Foster is mistaken in supposing that there was any material difference in the number of burners used by his employer during the two quarters, which have been compared together, and for which the bills are nearly equal — and that sundry consumers of gas have used their burners a certain number of hours, according to their best recollection, and have burned more gas at one period than at another.

The whole force of the defendant's argument as to the incorrectness of the meter, drawn from differences between the amounts charged, and the amounts supposed to be used, depends upon the ACCURACY and *judgment*, with which experiments are made and observed: and to make experiments at all conclusive upon such materials as these, requires a person of philosophic mind — of education in many of the physical sciences — of quick eye, and skilful hand: — Few persons are competent for such labors. In no case has the defendant

produced evidence of a single experiment performed by any person whatever. He has drawn his inferences from opinions or estimates of different consumers; who have in no instance been present at all times during the experiment — and have in no instance adopted any process of ascertaining the height of flame, the amount of gas, the degree of light, the exact length of time of burning gas, the size and number of orifices in the burners, the distance from the burner at which the oxygen of the air unites with the hydrogen of the gas — so as to produce that incandescence of the carbon, on which the brightness of the light principally depends, — the *size*, *shape*, *altitude*, and thickness of the glass cylinder which sits upon the burner, and on which the amount of draft and the perfection of combustion in a great degree depend.

No more deceptive standard of comparison of the consumption of gas by different persons, at different times and places, could be imagined than such observations as have been put in evidence. And for this there are various reasons. One is the error in regard to the *time of lighting up*, which is a very general error. The common idea appears to be that the usual lighting hour in the late winter months, is about half past four, but I undertake to say that, frequently, 20,000 feet of gas are burned in a day in Boston, in those months, before four o'clock in the afternoon. The amount withdrawn from the great gasometer at the gas works proves this. A register there indicates the number of feet of gas manufactured each day, and the number which is distributed — and the quantity which has been consumed can be seen at a glance at any hour of day or night.

Nor is it possible for a man to tell with accuracy the average number of hours he has used his burners for a month — much less a quarter — unless he has kept a record of each day's burning. Nor can the quantity of gas burned in the same hours on different days be correctly estimated for three months. Yet upon these circumstances, and especially on the last, are the judgments of quantities consumed made up among the people. Need I say how utterly impossible it is to tell how much gas is burned by observing the height of the flame? Increasing this height of flame does not increase *pro rata* the amount of gas used, as you will remember from *Slader's* testimony. He states that, on actual experiment, he finds that the common argand burner with the flame set at three fourths of an inch in height, will burn about two feet of gas per hour; at one and a half inches, it will burn about three feet; at two and one fourth inches, about four

feet; at three inches, about five feet; and at three and three fourths inches, about six feet. So that every burner will consume from two to six feet of gas according to the variation in the height of the flame from three fourths to three and three fourths inches — but the increase of consumption is not in arithmetical proportion to the increase in height.

Now let a man regulate a single burner at any height of flame he pleases, and tell me how many cubic feet of gas he supposes he burns each hour to-night. Let him take the same burner to-morrow night and tell me how much he burns then. Let him go on for a quarter, and tell me at the end of the three months the total amount he has burned. Does any body suppose he would do more than to approximate the true number of feet? Why, the amount of gas that flows through a single aperture in the perimeter of the burner varies through a great range according to circumstances, being chiefly controlled however by the pressure on the gas, its friction in passing through the pipes, the amount of draft, &c. It would be almost as difficult to *calculate* the quantity of gas delivered through any given burner, at any given height of flame, as to construct the formulæ by which the laws of flowage of water in pipes or canals are indicated — and every one acquainted with *hydrodynamics* is aware how complicated and how difficult of application they are. You all have noticed the flame of your gas lights rising and falling repeatedly in the course of the same evening, without any change in the regulating stop-cock of your burners. If you have lighted considerably earlier than the consumers in general, you have seen your flame diminish from time to time, as street after street has been lighted up in your neighborhood. And if you have had occasion to burn till a late hour, you know that, as business ceases, and the stores close, your flame springs up — more or less suddenly — according to the simultaneous or gradual extinction of other lights. And if you still keep open till the theatres and other places of amusement have closed their doors, and extinguished their lamps, you find that your stop-cock needs to be partly closed in order that you may not burn or waste much more gas than you require.

You recollect the testimony of Mr. *Blake* that a *single burner may be made to consume from one fortieth of a foot to twenty-four feet per hour* — and you saw this maximum quantity actually consumed in one of the burners in the lobby of the court-room. And, moreover, we must recollect that even though the gasometer itself were under a constant pres-

sure — yet each burner is subject to considerable variations of pressure, as stated before — a thing which cannot entirely be avoided; so that there is no gauge by which to set the height of flame, and no possibility of *keeping it at the same height*, without watching it at every moment, so as to form any accurate judgment of the quantity of gas consumed. The most you can do is, to form a conjecture on the subject.

But, gentlemen, there is another source of error in this class of investigations. We are apt to suppose that equal amounts of light will enable us to see equally well at all times. This is not so. Light is of so ethereal and subtle a nature, and the eye so changeful in its humors, that the quantity necessary to enable a man to see clearly, may vary greatly at different periods; and this amount cannot be judged of from the *apparent* degree of light required and obtained. There are various other considerations entering into this question — whether the light produced at two periods is equal? Among these are the state of the atmosphere — the different constitution of different eyes in regard to the capacity of enduring light — and the physical health and strength of the system. The sickly student, bending by the side of his midnight lamp, finds his retina too sensitive even to its dim and flickering ray. At another hour, with his gun upon his shoulder, he follows the course of his game in eager and painless pursuit along the refracting sand of the sea-shore amidst the intensest glare of the blazing noon. So also we must take into consideration the different avocations of those who experiment on gas light — extending into almost infinite variety; these, and various other circumstances must be taken into account in estimating the degree of light required, and the amount of gas used in producing it. If then it is so hard a thing, by looking at the burners, to judge of the single fact of the *quantity* of gas consumed — so impossible a thing to judge of it correctly without actual measurement — when the question is complicated by the introduction of all these other elements, you perceive at once that all attempts to make a comparison of judgment in regard to the relative amounts of gas burned at different points, must be vain and unsatisfactory.

Now, gentlemen, I ask you to notice one fact. In the whole course of this trial the defendant has not brought a single witness to the stand who is not interested more or less, in one way or another, against the Corporation — except the scientific gentlemen — and their evidence is all in our favor. It is all in accordance with that of the scientific gentlemen

whom we ourselves have called before you. No man of science has testified to *one solitary instance of the meter having proved erroneous* — no witness of any kind comes here with *one ascertained fact* whereby to overthrow its claims to correctness. Why did they not get some skilful man to try one single experiment to show its want of accuracy? They have had time enough surely — have they feared to make the attempt, as well they might? You will weigh then this harmonious scientific testimony, together with the ocular demonstration of the meter's complete accuracy which you have had — against the crude opinions of those who indeed know nothing of the matter except by vague conjectures. And even among all the witnesses offered by the defendant, no man of them has stated that he burned, or believed he burned, less than he paid for. Out of them all, every one but two has paid his bills and continues to take the gas. Does this indicate any want of confidence in the Corporation? But supposing you should be of opinion that in some cases there is a discrepancy between the quantity burned and the amount charged in the bills — is it not more charitable, and more rational, to suppose that there was some mistake in transcribing the registration of the meter, or that it was out of order — than that there was fraud or wickedness in the matter — or, what is still more preposterous, that the Company's whole system of operations is based on deception and fraud? Out of 2500 meters it would be strange, indeed, if ten might not be out of order. Out of 10,000 bills made out each year, it would be strange if some errors might not be committed.

Gentlemen, I have nearly done. A few words upon the last and foulest charge brought against the Company by the defendant, and I shall leave the case in your hands.

The fourth characteristic operation of Mr. Gault in this case, is a bold attempt to influence the minds of the jury against the plaintiffs, by the weighty and solemn charge — that to so great a degree are the affairs of the Company managed merely "*by guess*," that they have actually *sent out bills for gas for quarters during which no gas at all has been used.* And this Mr. Gault *said* he should prove. It would, were it true, be an exceedingly grave imputation upon the character of the Corporation, and of every individual concerned in such a proceeding. It is nothing more nor less, in effect, than a charge that the Company are in the habit of setting up false claims,—in short, of levying "black mail" upon their customers. If the respectable agent of this Company has been guilty of such conduct, it should be exposed — though

it would deservedly cover his gray hairs with dishonor. The charge has been publicly made in Court, and it has gone forth upon the wings of the wind to the ears of every gas consumer in the city. Was it made in good faith? Why was it put into the counsel's mouth by his client? Why was it thus attempted to overwhelm with shame and dishonor the gentlemen engaged in this Company, and especially the agent who has the chief management of their business? Why was it that the defendant should thus seek to make him hide his countenance in disgrace from the eyes of his fellow-citizens, amongst whom for so many years he has borne so high a reputation for honesty, intelligence and integrity? Why was it? You can judge of the defendant's motive, gentlemen, — and whether he who made it, himself *believed* the charge.

Let us dwell one moment on the only proof they have condescended to furnish.

Mr. *James H. Wheeler*, of No. 8, Central street, was the man whose evidence was relied on to maintain this accusation, and he was put upon the stand. Before he proceeded to testify as to the contents of *the bill* said to have been rendered to him *for gas which he had never used*, I asked to have the bill produced in Court that we might see the evidence with our own eyes. I asked him as a man of honor to produce the document, and he left the stand to procure it. But before he went out, I arose and stated in open Court — to him especially, in the hearing of his Honor, of the learned counsel for the defence, and of every body in the hall — and stated distinctly that I was authorized and directed by the agent of the Company to offer a reward out of his own purse, of FIVE HUNDRED DOLLARS *for proof of the existence of any such bill.* I wanted Mr. *Wheeler* to feel, not only the impulse of his promise under oath, but also the hope of a large reward, to induce him to produce that bill. You all remember this. Mr. *Wheeler* left the Court-house — *and that was the last we have heard of him.* He left the stand, entitled to five hundred dollars, if he could produce any bill against himself for gas when he had used none — and he never showed his head to us again. For if he had sworn on the stand as the defendant's counsel was told that he *would* swear, we should have had an account to settle with Mr. *James H. Wheeler* more troublesome than his bill for gas! But he has evaded, and escaped us. He has vanished like the ghost in Hamlet, shuddering at the first gleam of morning light. But let justice be done to the absent. Here is a transcript of his bill.

Wheeler & Cushing, No. 8 Central street, commenced burning gas, Sept. 2, 1845.

Burned to	Oct. 1, 1845,	$0.24
"	" Jan. 1, 1846,	2.00
"	" April 1 "	1.60
"	" May 14, "	0.80
"	" July 1, "	0.20
"	" Oct. 1, "	0.20
"	" Jan. 1, 1847,	2.00
"	" April 1, "	1.40
"	" July 1, "	0.70
"	" Oct. 1, "	0.70
"	" Jan. 1, 1848,	2.45
		$12.29

There is the grand total from September, 1845, to January, 1848, amounting to the sum of $12.29. Some entire quarters, you perceive, are only charged with seventy cents, and one with only twenty cents for gas. Ay, gentlemen, twenty cents for a quarter's bill! Hardly gas enough for a long breath — too little to seal a dozen letters with —

———— "*He* had not to repent
Of time-bewasted light."——

Now, gentlemen, the Corporation does not send out bills for twenty cents' worth of gas. It waits till the amount is sufficient to pay at least for the wear and tear of shoe leather on the collector's feet. It includes all these trivial sums in one bill, and it is rendered, when it becomes large enough to be worth collecting — whether that happens once a quarter, or not until after a series of quarters. That is the explanation of Mr. *Wheeler's* having had a bill for gas which he at first supposed he had not used. He found it so when he hunted up the bill, and was unwilling to re-appear upon the stand — I wonder not he was. There is the only show or shadow of foundation for the shameful and base slanders that have been trumpeted forth against this Gas Light Company :—

"Oh fie upon *thee*, slanderer."

And now, gentlemen of the Jury, I have closed the case on behalf of my clients, the plaintiffs in this suit. I have endeavored to prove to your satisfaction, the propositions —

That the Corporation has supplied some gas to the defendant.

That the fair value thereof is three and one half mills per cubic foot.

That the number of cubic feet charged in the books of the Corporation, is the amount registered by the meter.

That the meter is a reasonably correct measurer of the quantity consumed, and that this is demonstrated — 1st. By ocular proof — 2d. By analysis of the principles of its construction and operation.

That Gault is bound by contract, implied by his former course of dealing, to pay for the amount registered.

I have endeavored to explain the effect of all the derangements of the meter, upon the admeasurement of gas; and to expose the insincerity and falseness of the defendant's charges against the Corporation. At the risk of tediousness I have thought it my duty to enter into the subject fully. The members of the Corporation have long been anxious for an opportunity to show the public how they have conducted their business, and to disabuse the popular mind of those prejudices against them which some parties have been so active in creating. And now, gentlemen, we leave you to say, by your verdict, whether the instrument we use for measuring gas be not accurate and trust-worthy — whether the Corporation has not dealt fairly and even liberally with Mr. Gault — and all its other customers — and whether the respected "Agent of the Works," has been guilty of any conduct which is unworthy of an honest man.

Mr. WHITING concluded his argument at eighteen minutes after twelve o'clock. At twenty minutes after twelve, Judge BYINGTON commenced his charge, as follows:

GENTLEMEN OF THE JURY:

This is an action for the recovery of twenty-five dollars and fifty-five cents, the price of seventy-three hundred cubic feet of gas, which the plaintiffs allege they sold and delivered to the defendant, during the quarter of the year beginning October 1, 1847, and ending January 1, 1848.

The defendant denies that any gas was delivered to him, or, if any was delivered, not so much as is charged to him by the plaintiffs.

The pleadings present the issue in question, in a very simple form, but the proof of the facts in issue has required a great deal of testimony, a long and careful investigation of the manner in which the plaintiffs supply their customers with gas, their mode of measuring gas, and a trial of the accuracy of their measure.

The matter in controversy is of small amount, and of comparatively little importance to the parties, but a question involved in the issue, namely, the accuracy of the meter of the plaintiffs by which the gas is measured, is one of great interest to the plaintiffs, and to that numerous class of persons who are supplied with light by them.

The counsel have indulged in remarks in praise and censure of the parties to the suit. All that you have to consider in relation to them is that *they are both legally innocent*, having a right to a trial and to a verdict in accordance with the law and the evidence. You are to try the case, not the parties, and the idea is not to be entertained, for a moment, that a verdict in a matter of contract can in the least degree be affected by a consideration of the *parties* to a suit. If a different result may be had in one case from that in another, *upon the same evidence*, because the parties are different, then there is an end to the pure, the equal administration of justice, so all-important to the happiness of mankind.

The great and important inquiry in this case is, whether the measure of the plaintiffs is to be relied on as accurate. There is another question also, namely, whether it is proved to your satisfaction what was the number of feet of gas indicated by the register at the time the witness took an account of it, on or about the first of January, 1848.

The counsel for the plaintiffs, near the close of his argument, and after having, as he claimed, demonstrated the accuracy of the meter, and answered all objections to it, interposed a claim that if he had not done so, yet the plaintiffs were entitled to recover in this case, because, it having been proved that the defendant was accustomed to take gas as registered by the plaintiffs' meter, and to pay his bills, and has made no objection to the meter, but has continued to take the gas, he is bound to pay for it as registered, until he gives notice that he is not satisfied with the accuracy of the measure. And the Court is asked to give you such instructions. I should feel bound to do so if I thought them correct, though by so doing a leading object of the parties, in trying this case, might be defeated. But I do not think this rule applicable.

Parties may agree upon a measure, no standard being provided by law; they may adopt any mode most convenient to themselves — by mutual agreement. In this case it appears from the evidence, that it requires great skill, the application of science, to measure a meter accurately; that it cannot be done at all, or at least not without great difficulty, at any place but at the works where gas is manufactured;

that the plaintiffs invariably measure, and try, and furnish the meters to their customers. The plaintiffs by thus furnishing meters represent that they are accurate, and if their customers, relying on such representation, pay bills rendered according to such measure, it is not an acknowledgment by them of accuracy, and they have a right to require the plaintiffs to prove the meter to be accurate — the means of proving and the means of obtaining the knowledge of the fact resting exclusively with the plaintiffs.

The defendant, on his part, claims that it is a fact proved in the case, that the illuminating power of gas depends upon its density, and as it is proved that the meter does not indicate the density of gas as it passes through it, but alike measure a foot of gas whether under a greater or less pressure, — he may have got a less amount of illuminating power than he was entitled to. On this point the Court instruct you that the defendant in contracting for gas, contracted for it in the state, and to be delivered under the pressure, that the plaintiffs were in the habit of selling it, and had sold to the defendant previously, there being no express contract proved relative to its density. The price was fixed in reference to this.

The main and great question, therefore, must be decided by the jury, and the plaintiffs must show the accuracy of their meter in order to be entitled to a verdict for the full amount of their claim. In order to do this they have called several witnesses to show what is understood by a cubic foot of gas — to show that their meters are all made by one person in their employ, and that they are all measured with the greatest care by persons of competent skill — that the meters of the plaintiffs have been tested and compared by other meters used in other cities of this country and with meters used abroad, and especially with the Edinburgh meter, which is claimed to be perfect — that there is no difficulty in measuring a foot of gas, &c.

The plaintiffs have further offered proof of the accuracy of their meter by an experiment made in your presence during the trial, with the gasometer and the meter. And from all these sources they claim to have established the correctness and accuracy of their meter.

And, — although they have not brought witnesses nor proof that the Edinburgh meter has been actually tried and proved as it purports to have been — inasmuch as it is commonly received and used by persons acquainted with the subject as true, this is evidence that it is true.

The defendant denies that there is any evidence that the Edinburgh meter is accurate.

In the ordinary trial of matters of fact in a court of justice we proceed on many known and admitted truths. We must take some things — those things which the common observation of men has proved to be true, to be so. If, for instance, a witness is called to prove that one party worked for another an hour, we take it for granted every body knows what an hour means; the witness is not required to give a definition of time, to explain the mechanism of a time piece, the motions of the pendulum, or the revolutions of the earth; if he were required to explain these matters he might be required to go further and prove that there was a world, the existence of which it is said has been doubted, and this it would be very difficult for him to do, although very few doubt that there is a world, or at least something that answers the purpose of one exceedingly well. Take another familiar case. A suit is brought for a piece of cotton cloth; a witness testifies, and is allowed to testify to the sale and delivery of cotton cloth, although he has never seen a yard made, nor a boll of cotton growing. In such a case the knowledge of the witness is derived from hearsay, by what other people have told him, yet he is allowed to testify to certain facts, as facts within his own knowledge, because he testifies to a matter of common knowledge. And thus a great many facts are satisfactorily proved by the testimony of witnesses, whose knowledge is derived from what others have told them. In relation to truths which are within the knowledge of men of common observation, witnesses are allowed to testify directly.

By the separation of employments or the division of labor, there is also a division of knowledge, or, in other words, a knowledge peculiar to these divisions, as of artisans, manufacturers, engineers, professional men, &c., &c. There are truths not generally obvious, requiring much study to learn, and they are known only to those who have made them a subject of study; but these truths are as familiarly and commonly known to those who have made them the subject of study, as are to most men the more general truths I have spoken of. And they who are familiar with them, are allowed to testify to them, as received and acknowledged truths by those who do thus understand them, as men in general are allowed to testify to facts generally received as true.

On this ground the plaintiffs claim, and they may well claim, that a measure of gas generally received as true by those interested to establish a true measure, and who have a

knowledge of gas and of the proper manner of measuring it, may be used as evidence of what is a true measure.

But not relying on this alone, they claim it as an answer to the allegation that they have not proved the accuracy of the Edinburgh meter, that they have proved what they have attempted to prove.

The defendant claims that he has shown that the meter is an inaccurate measure, for gas passes through it sometimes and does not register at all; that the meter gets out of order, is displaced, has too much or too little water, and in various ways is liable to be untrue.

The plaintiffs, conceding that the meter may make some small mistakes, maintain that whatever mistakes it makes, are made *against the Company, and in favor of the consumer;* that it speaks the truth from necessity if not from choice, and is one of those sure and valuable witnesses that cannot lie. The defendant to this replies, that if he has established the fact that the meter is not invariably correct, no matter which way it errs, it cannot be relied upon; and that it would be a most singular creature that would be false to the hand that formed it and to no one else.

You must judge. The case has been very ably managed on both sides. The counsel for the plaintiffs has given a most lucid, able and interesting explanation of all matters relating to the subject.

The defendant has also offered testimony of those using the gas, tending (as he claims) to show that the plaintiffs, have varied in their charges, and from which it may be inferred that they have at some times charged for more gas than has been burned.

The attention of all the witnesses was not particularly called to all the facts necessary to form an accurate opinion as to the number of hours that the gas was burned, the height of flame, &c. And the counsel for the plaintiffs contends that if, with all the pains the Company have taken to make a correct measure, it cannot be relied upon — still it cannot be overthown by evidence which is more vague and uncertain.

Gentlemen, you will decide upon the whole matter. The burthen of proof is on the plaintiffs. Have they satisfied you of the truth of their propositions, and has the defendant failed to raise a reasonable doubt in your minds? If so, you will find for the plaintiffs — otherwise for the defendant.

Judge Byington concluded his charge at thirteen minutes before one o'clock, when the case was given to the Jury.

At ten minutes before one o'clock, the Jury retired for consideration.

At twenty minutes after four o'clock, the Jury returned into Court, and rendered a verdict in favor of the Plaintiffs, for the whole amount claimed, and costs.

APPENDIX.

THE following figures are the drawings of a GAS METER, referred to in Mr. WHITING'S argument, in the preceding pages.

Fig. 1.

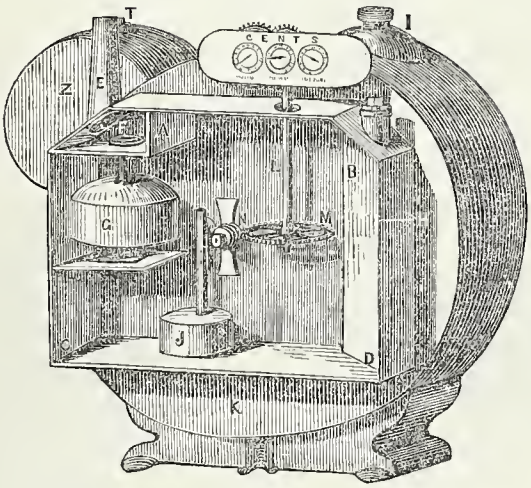


Fig. 2.

Fig. 3.

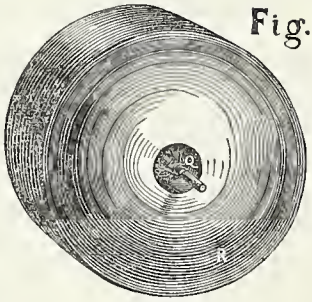


Fig. 4

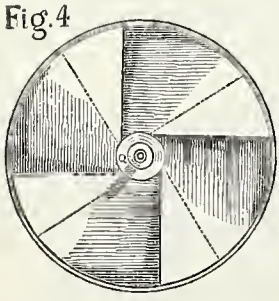


Fig. 5.

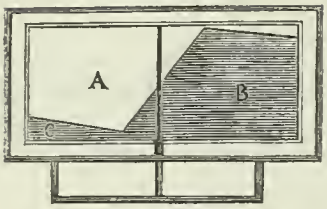


Fig. 6.

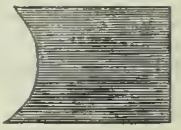


Fig. 7.

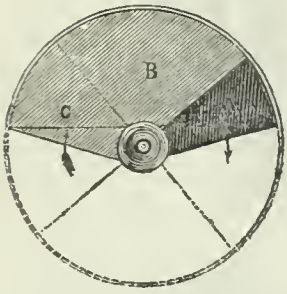


Fig. 8.

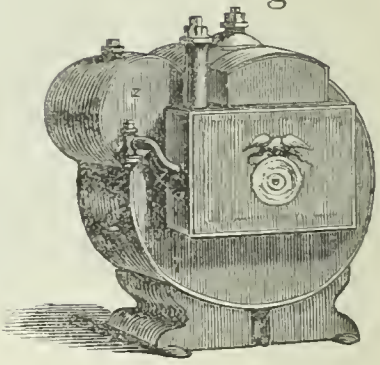
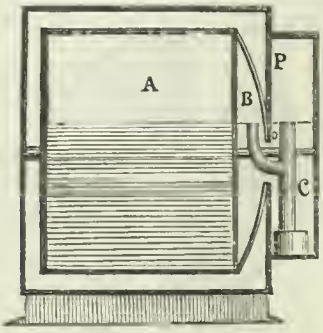


Fig. 9.



NOTE,

BY THE AGENT OF THE BOSTON GAS LIGHT COMPANY.

THE Boston Gas Light Company have laid before the publie, the results of this trial, not for the purpose of informing them that they have prevailed in this suit, but with a view of giving information whieh they trust will be useful to all consumers of gas — inducing them to place reliance in the truthfulness and extreme accuracy, of that beautiful, but mueh abused instrument, the gas meter.

The books of the Company were submitted to the Court and Jury; showing, from the method of making their entries, and keeping their accounts, that should the man who takes the state of the register of the meter, mistake a figure, making the amount larger or smaller than the amount aetually used, yet as the past number is deducted from the present to aseertain the amount used, an error must of necessity eorrect itself; and the sum total will be the true quantity consumed.

Consumers are respectfully requested to read with care, the lucid explanation of the construetion and operation of the meter made by the senior eounsel; whieh, with the aecompanying drawings, will, we trust, make every one as well aequainted with an instrument of sueh general use, as we are ourselves. His remarks, as to the height to whieh the flame is earried, also merit attention. The height of flame is entirely regulated by the stop-eock to each burner, and as every one well knows that the flow of water from a cask is more or less, as the cask is more or less opened, so the same law operates with æriform, as with other fluids.

That errors may sometimes oecur in the addition or subtraction of numbers we admit; but as the previous, as well as the present state of the meter is in all cases, distinetly registered on the bill, all errors ean be detected at a glance; and in a set of books containing upwards of three thousand open accounts, it is not wonderful that mistakes should sometimes occur; whenever they do they are eheerfully and promptly correeted, whether discovered by ourselves or others.

We feel no enmity to the defendant in this case, but are under some obligations to him for giving us an opportunity to put at rest the wholesale calumnies whieh have for so long a time been lavished, not only upon this, but, as we believe, on all other Gas Companies.

In eonelusion, we shall endeavor now, as we have ever done, to do all in our power to merit the good opinion of our customers, by giving them a good and pure light, at all times available, and at such a price as will give to the Company such remuneration for the capital employed, as would be considered just and fair in any enterprise which requires so much care, and skill, and capital, for its management.

Trials.

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DATE	ISSUED TO

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